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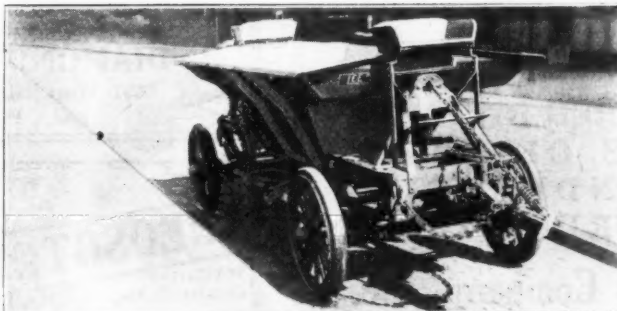
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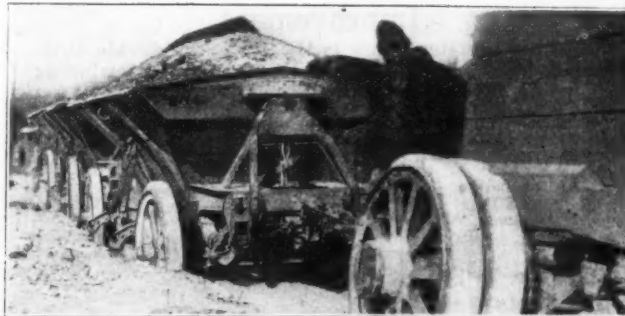
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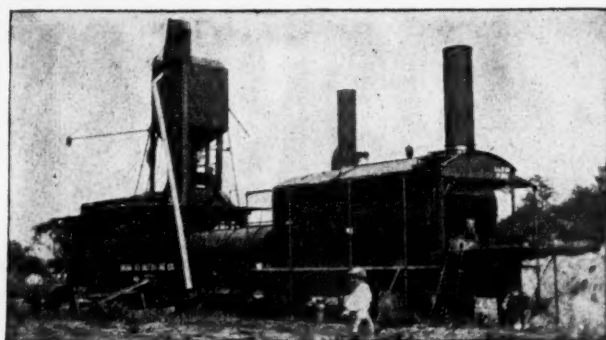
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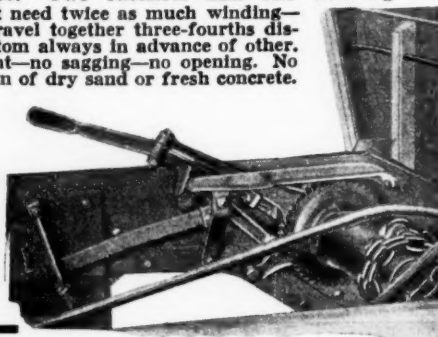
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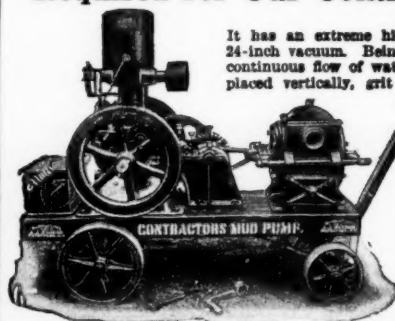
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Contributions suitable for this paper, either in the form of special articles or as letters discussing municipal matters, are invited and paid for.

City officials and civic organizations are particularly requested to send to Municipal Journal and Public Works regularly their annual and special reports.

## Information Bureau

The Information Bureau, developed by twenty-one years' research and practical experience in its special field, is at the command of our subscribers at all times and without charge.

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## SEWAGE PLANT OPERATION.

In the case of any type of operating plant, the actual experience in operation is more valuable as an aid to development toward perfection than any theories based on a study of the plans. With no kind of plant, probably, is this more true than with one for treating sewage, for here there are imperfectly understood agencies modifying or even being relied upon for the processes and changes desired. For this reason, experience in operating such plants is especially valuable.

Unfortunately, however, intelligent and reliable studies of their operation are very few, and there are pitifully few exact scientific data upon which engineers can base their plans for new plants. It would seem, therefore, to be the duty to the profession of all engineers and chemists who have or who can obtain such data to give them publicity, and to use every effort to increase their number and completeness.

In this issue we present some facts concerning the operation of the plant which treats the sewage of Plainfield and two adjacent boroughs. This plant has experienced to an excessive degree the foaming trouble which is reported from so many Imhoff tanks, and has practically mastered it. Superintendent Downes has also worked out a method of disposing of screenings and sludge which seems to solve most satisfactorily (for a sandy soil, at least) this problem which is so troublesome at most plants. The sprinkling filter fly nuisance also has been solved here. Any sewerage engineer could obtain valuable information by a visit to this plant.

## CONTRACT NEWS UP TO DATE.

Last week we renewed the publication of the items of "advance contract news" which have for years been one of the features of this paper in which we congratulate ourselves on far surpassing any of our competitors, but which the printers' strike compelled us to omit for a few weeks. Although the dates of the several issues are still two or three weeks behind those of publication, the contract news is brought up to the date of publication, regardless of the date given to the journal and the consequent anachronism.

## FLOATING GARBAGE REDUCTION PLANT.

Since the article under the above head in this issue was set in type we have learned that the idea of a floating garbage reduction plant has progressed to the point where the Board of Estimate and Apportionment has appropriated funds for preparing plans and specifications for such a plant. It certainly is a novel plan for preventing a nuisance from such a plant to make the plant a floating one and operate it as far off the shore as may be necessary.

## PLAINFIELD'S SEWAGE TREATMENT PLANT

**Interesting Features of Three Years' Operation of Imhoff Tanks and Sprinkling Filters—Excessive Foaming and How It Was Overcome—Fine Screening—Use of Screenings and Sludge on Farm Land.**

One of the first communities in this country to build a septic tank and filter the effluent was Plainfield, N. J. After a number of years of service this plant was outgrown, although extended, and the fineness of the local sand rendered it unsuitable for sewage filtration. Consequently, about six years ago the city of Plainfield and the boroughs of North Plainfield and of Dunellen arranged to combine in the construction of a new plant at a new location, which would treat the sewage of all these communities. The organization under which this plant was constructed and the operation is being carried on goes by the name of "The Joint Meeting of the Inhabitants of the City of Plainfield, the Borough of North Plainfield and the Borough of Dunellen." The operation is in charge of an operating committee, being in the immediate charge of a superintendent. The plans were prepared and construction carried out under the supervision of George W. Fuller as engineer, and he is retained as consulting engineer. The superintendent is John R. Downes.

There are several interesting features about this plant, not the least of these being the name which has been given to it—Green Brook Park, and the effort to live up to this designation. The plant is on the bank of and discharges its effluent into Green brook. It is located in a farm of about ninety acres, about forty-five of which are under cultivation. The plant itself is set back about a quarter of a mile from the highway and is reached from it by a driveway lined with Japanese hawthornes, the entrance to this drive being indicated by a good-sized signboard bearing the words "Green Brook Park." The grounds are neatly kept up, the banks around the tanks are sodded, and masses of shrubbery located at effective points; the buildings are of brick with tile roofs, plain but neat of design; and there is nothing to indicate the presence of sewage until one stands over the tanks. There is practically no odor, and altogether the plant might well be considered an addition to the neighborhood rather than a nuisance.

Other somewhat unusual features are the use of a fine screen in advance of the Imhoff tanks; the method of disposing of the sludge; and certain of the experiences encountered in operating the plant and the methods employed in meeting the difficulties.

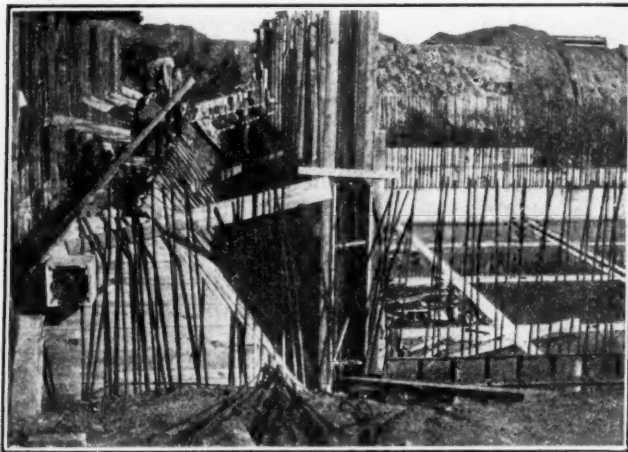
The sewage from the several communities reaches the

plant through a rather long siphon composed of two lines of 20-inch cast iron pipe. Much of the sewage is pumped because of the level country and the long distance over which some of it must travel. The plant went into service in November, 1916, and the siphons have not been cleaned out since then, although it is believed that some sediment has probably collected in them and that cleaning out may sometime become necessary. The sewage is fairly fresh, coming from points from two to ten or twelve miles away, is only partly comminuted and shows no signs of septic action. At the present time the amount reaching the plant averages about three and one-quarter million gallons a day.

The plant as originally constructed consisted of six Imhoff tanks, each sixty feet long and containing five hoppers in the bottom, the walls of the flowing-through compartments having a rather steep slope and being separated by a vertical curtain wall which rests upon the beam placed below the slot to divert the gas to the gas outlets. Two dosing tanks discharge the tank effluent onto sprinkling filters, and the effluent from these passes through a secondary Imhoff tank before being discharged into the brook. The sludge from the tanks is drawn off onto beds at the foot of the embankment along one end of the tanks.

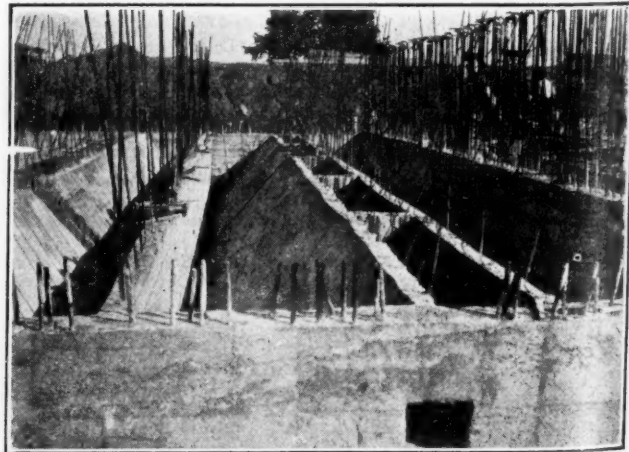
From the time, about three years ago, when the operation of the plant first became established, the effluent has been continuously stable, there having been only one occasion when the methylene blue sample failed to retain its color for twenty-one days. Samples are taken at eleven and three o'clock each day and those treated with methylene blue are kept in bottles for twenty-one days and the bottles then emptied to receive new samples.

The difficulties encountered in the operation have been those found in other plants, that for which the solution was least readily found being the foaming of the tanks. While most Imhoff tanks seem to foam more or less, the foaming at these tanks reached such proportions that there seemed absolutely nothing that could be done but let them foam until they stopped of themselves. The foaming scum overflowed the gas vents (which extended continuously along the entire side of each tank) covering the surface of the sewage in the flowing-through compartment to a depth of a foot or more in spite of all ef-



IMHOFF TANK UNDER CONSTRUCTION.

Showing forms and reinforcement for curtain and outside walls and for inclined bottom slabs of flowing-through compartment.



IMHOFF TANK UNDER CONSTRUCTION.

Showing the outside and curtain walls and inclined slabs partly completed, with reinforcement for the remainder in place.



forts to remove it as fast as it formed. By using high baffle boards near the outlets, most of this scum was retained within the tanks, and the foaming appeared to cause very little undesirable effect upon the tank effluent. During the winter a most peculiar phenomenon occurred, the foaming scum in the gas vents freezing over except at certain points, where it rose and froze into "chimneys" resembling stalagmites, through the top of which chimneys the scum continued to rise and overflow and freeze, the chimneys thus being built up to a height of about four feet and the gas continuing to escape from the openings in the tops of them.

While the six tanks were being used continuously, although the amount of sewage was at that time less than that for which they were designed, more than half of the sludge collected in the first of the five hoppers in each tank, and most of the remainder in the second hopper, while reversing the flow only repeated the condition at the other end, giving practically no sludge in the middle compartment and relatively small amounts in the second and fourth. It seemed probable to those in charge that this heavy sludge deposit in the end hoppers might have something to do with the unusual amount of foaming experienced. (The depth of sludge, even if spread throughout the tanks, would be greater than had been estimated, since the size of the sludge compartment was based on an assumption of sludge containing 88 per cent. of water, whereas the sludge which collected was found to average about 96 per cent. water.)

A number of suggestions for overcoming the foaming were made to the engineer and superintendent and others were devised by them, and fifteen or twenty different ideas were tried, but none of these showed any promise of permanent benefit or even temporarily did much to lessen the trouble. Finally, about a year and a half ago, it was decided to try the use of a fine screen for removing the larger suspended matter from the sewage before it entered the tanks, and just about a year ago a R. W. screen



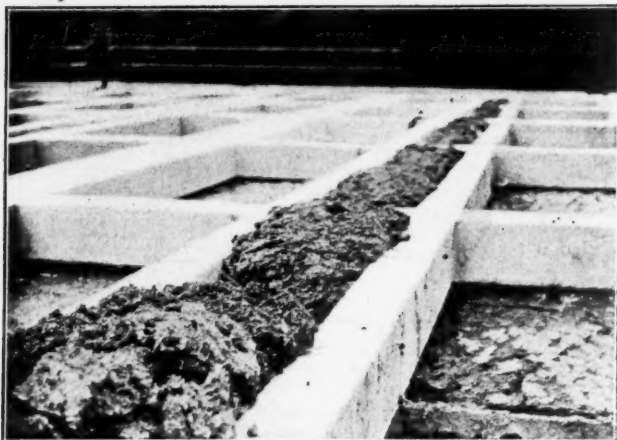
SPRINKLING FILTER UNDER CONSTRUCTION.  
Sprinkler main and risers in position.

was put into operation. At about the same time a change was made in the method of operating the tanks, all of the sewage being sent through two or three tanks at a time; all six tanks were used, but in rotation. This gave two or three times the previous velocity to the sewage passing through the tanks and resulted in distributing the sludge more uniformly throughout the sludge chamber. With the adoption of these two changes in operation the foaming difficulty appears to have been reduced to relatively unimportant dimensions. Whether this is due most to the method of passing the sewage through the tanks more rapidly or to the use of the screen, Superintendent Downes was unable to say, but believes that each should be credited with part of the improvement.

Although very little foaming has shown itself in the sedimentation tanks for a year now, the change in operation has been accompanied by a considerable increase of foaming in the secondary Imhoff tank, which receives the effluent from the sprinkling filters. The foaming in this one small tank, however, is not so serious as it had been in each of the six primary ones, and can easily be



SPRINKLING FILTER UNDER CONSTRUCTION; SHOWING COLLECTING DRAINS, DISTRIBUTING MAINS IN POSITION AND DISTRIBUTING PIPES RESTING ON BOTTOM READY TO BE SET; POSTS FOR SUPPORTING SPRINKLER SPECIALS. FILTER STONE IN PLACE AT THE LEFT.



HEAVY SCUM IN GAS VENTS.  
Nearing the end of the foaming period.

handled by the two or three employees at the plant. In spite of the increased velocity of flow of the sewage through the tanks there has been no trouble with the sprinkling filters. The nozzles practically never stop up, and there is very little pooling on the surface of the filters, what little there is being easily remedied by forking over the stone on the surface. As stated above, the effluent has continued to remain stable, as indicated by the methylene blue test.

The contract for the fine screen was let in the spring of 1918, and the screen placed in operation about a year ago. This screen is of the R. W. type, ten feet in diameter and set at 15 degrees with the horizontal. The orifices are slots one-sixteenth of an inch wide. There are no slots in the "hat" or projecting part of the screen, which is of solid plates. The bristle brushes brush the screenings into and through a trough, from which they drop into a box about two feet below. Originally, it was intended to brush the screenings into tubs, each holding about 8 cubic feet, but these were found to be too heavy for the men to handle. Instead, an attendant visits the screen about once an hour during the day and shovels the screenings from the trough into a self-loader, which was home-constructed and consists of a wooden chute with one-half its length overhanging and held in horizontal position by means of a latch. A wagon backs in under the overhanging end of the self-loader, the latch is

knocked out and the screenings are dumped into the wagon. The self-loader holds one day's collection of screenings at the present time, which amounts to about two cubic yards measured after draining about twelve hours.

The screen removes about 15 per cent of the suspended solids, this figure being obtained by weighing an entire day's screenings and reducing them to a dry basis and comparing them with the suspended matter in the effluent from the screen, also reduced to a dry basis. Quite a number of small pieces of paper up to two or three inches square are found to slide through the slots, and considerable fecal matter is washed through or pushed through by the brushes, so that the effluent does not look greatly dissimilar from the ordinary crude sewage. Mr. Downes believes, however, that the solids removed contain a large percentage of those which caused the foaming trouble, and that the improvement effected is much greater than that indicated by the appearance of the screen effluent.

There has been no trouble with the operation of the screen during the year, which has been continuous. On one occasion a piece of broomstick became wedged in the channel through which the brushes travel, but the brushes jumped over this with a slight jar until it was removed; on another occasion a drowned cat in a bag had to be removed by hand; but aside from a few instances like this, the screen has operated without attention other than oiling and periodic inspection. The cost for power has been almost negligible, the principal expense being about \$1,000 a year paid to the night attendant, who would not be needed at the plant but for the screen. The building is necessarily heated in winter to prevent the freezing of the sludge and possibly of the sewage in the screen house, and there is also a slight cost connected with this. The brushes, which are constructed of bristles, are reversed end for end once a week and as yet show no signs of wear or needing renewal.

The screenings which are dumped into the wagon are used for fertilizing the land which is being cultivated. The wagon is furnished with a manure spreader such as is in common use on farms, by which the screenings are spread onto the land, allowed to stand a few hours to drain and then plowed under. A small farm caterpillar tractor is used for hauling the manure spreader and plow. The same spreader is used for spreading the dried sludge on the land. These screenings and sludge are found to be of great benefit to the soil, the crops raised being much heavier where this material is used. One of the neighboring farmers has been using it for about a year on part of his land and the difference between this and the remaining portion of his farm in the appearance of the crops is most remarkable. It is probable that the use of this sludge would not be beneficial on a clay soil, but the soil here is sandy to an indefinite depth, and ordinary fertilizer which is applied to it is washed down about 16 inches below the surface before any appreciable amount of it remains to enrich the soil.

This method of disposing of the screenings and sludge is perhaps the most admirable feature of the operation of this plant, for the originating and working out of which Mr. Downes deserves great credit. It is a great labor saver, and, by eliminating sludge heaps about the grounds,



FOAMING IN TANK NO. 5; OVERFLOWING GAS VENTS.



has noticeably reduced odors as well as improved the appearance of the place. An additional feature of the plan which he devised is the use of a 1,000-gallon tank cart to facilitate the removal of sludge directly from the tanks in emergencies, as when the sludge beds are frozen or filled up. The liquid sludge is run out through a gate in the back of the cart directly onto the land to be fertilized. Although the volume of this wet sludge is much greater than that of bed-dried sludge, the difference in manner of handling makes the direct distribution by tank cart a close rival of the regular method in efficiency.

At present, sludge is drawn from each tank once a month, in rotation. The tanks are used in rotation so that each of the six receives sewage for two or three days and rests for the remainder of the week. The sludge, after drying on the sludge beds, can be shoveled readily into a wagon by means of a fork, and most of it is spread on the Green Brook Park land by a manure spreader, as already described, part also being taken by a farmer living in the vicinity. In drawing off the sludge at these regular intervals, it is found that withdrawing from each of the ten hoppers all of the sludge ready for removal results in lowering the sewage in the tank from two to three inches for each hopper, or a total of about 24 inches for the entire tank, equal to 100 to 120 cubic yards of 94 per cent to 96 per cent sludge.

No trouble has been found at any time in drawing off the sludge and it is not necessary to start it by using water from the pipes which were placed around the hoppers for this purpose.

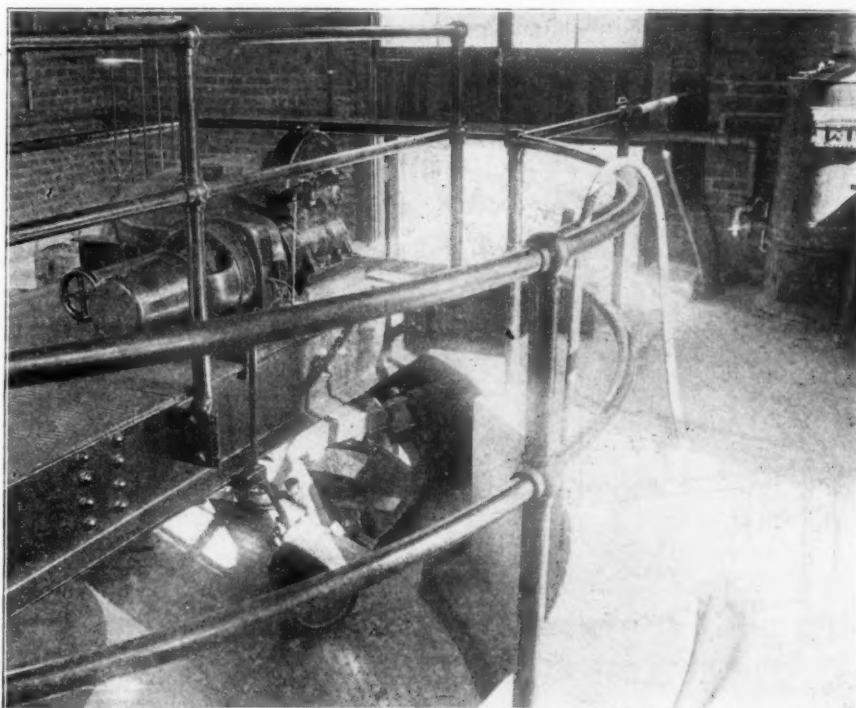
The secondary tank, as has already been stated, foams more or less since the change in method of operating the tanks, and the scum which arises in the gas vents is dipped or shoveled off into wheel-barrows and dumped into a lagoon at the foot of the bank around this tank. This, like the sludge which is drawn off, did not appear to be giving off any appreciable odor at the time the writer visited the plant, and we are informed that there has at no time been any justifiable complaint from this cause. No sludge collects in this secondary tank, all of the suspended matter rising to the surface as scum.

Another rather unusual operating feature of this plant is the elimination of the flies which are found to be such a nuisance in connection with sprinkling filters. Up to a year or two ago this trouble was experienced here also, but at the suggestion of Dr. Thomas Headlee, state entomologist, New Jersey Agricultural Experiment Station, the expedient was tried of flooding the bed by backing up the sewage until it stood about two inches above the surface of the stone, holding it there about twenty-four hours and then drawing it off. This seemed to kill all of the larvae of the flies and by repeating this once a month their breeding in the filter seems to be entirely prevented. When drawing off the filter after flooding, the effluent, of course, is not a purified filter effluent, but within less than twenty-four hours the effluent becomes normal again. To provide for flooding the filters, a dam was built across the main drainage channel into which the sub-drains of the filters discharge and a gate provided in this dam, so that it was only necessary to close the gate in order to flood the filter.



FOAM CHIMNEY ON GAS VENT OF IMHOFF TANK.  
Scum board which holds back foaming overflow from reaching outlet is shown in foreground.

At construction there was placed in each of the two dosing tanks, an appliance for keeping count of the number of doses discharged during the day and thus of the



INTERIOR OF SCREEN HOUSE.  
Part of screen and two brushes in view below floor level; motor which drives screen is seen just beyond railing.

quantity of sewage treated. Some changes in this have been made by Mr. Downes to make its working more reliable, and it now consists of a float in the dosing tank suspended from a wire which passes through the roof of the tank and into a small box attached thereto. Fastened to the bottom of this box is a three-figure counter, and a two-inch cast iron pulley standing in a vertical position. The wire, passing onto and half-way around the pulley, is attached to the top of it, and to the other side is fastened a piece of lead which serves as a counter-weight to lift the wire a short distance when the float rises. On this wire is fastened a small piece of metal which engages with the counter and causes it to register as the counter-weight pulls the wire up. When the tank discharges, the float pulls the wire down and raises the counter-weight again.

In a brick building near the inlet of the plant and similar in appearance to that housing the screen is the office of the superintendent and a well-appointed, convenient and well-lighted laboratory. Here also is a shower bath and dressing room for the laborers. At present, two laborers are employed in the daytime and one attendant at night.

In considering the efficiency of the plant working under trying conditions of the "ripening period," as it is often called, and in appreciation of the up-to-the-minute completeness of the working equipment, one must give due credit to the unstinted support of the Operating Committee. The members of this committee, though serving without compensation, have given the entire afternoon of every second Sunday for three years to meetings at the plant for considering ways and means. That they have shown much foresight and breadth of vision is evidenced by the results. Mr. Downes states that in his fifteen years' experience in water and sewage purification, his experience with this committee is unique.

#### FLOATING GARBAGE REDUCTION PLANT.

The large garbage reduction plant which has been operated off and on during the past two years with considerable difficulty, both mechanical and legal, for disposing of the garbage of Greater New York City, has been closed down for some time, following most vigorous protests by the inhabitants of Staten Island, where the plant is located. At present the garbage is being taken to sea in boats and dumped there. The problem of garbage disposal for a large city like New York is much more serious than for a smaller city, both because

the enormous size of the plant makes it many times more objectionable than would be the smaller plant required by a medium-sized city, and also because the density of population in almost all of the surrounding territory makes it difficult to find any spot where there are not near neighbors who will protest vigorously (and with considerable political influence) against the location of such a large plant anywhere in their vicinity.

Street Cleaning Commissioner Arnold B. MacStay, who has immediate charge of the disposing of New York City's refuse, is opposed to the cost and waste of materials involved in incineration and is endeavoring to work out a plan by which the city's garbage can be disposed of with some financial return if not at a profit. Chemists have been experimenting with the city's garbage and have worked out plans for treating it by which would be produced chicken feed, a dry and easily handled fertilizer base, and fuel compressed into balls.

The most interesting feature however, is the solution of the problem of location of the plant. Commissioner MacStay says that the city is seriously considering the installation of garbage utilization ships or floating reduction plants, which would pick up the garbage at the water front dumps each day and begin treating it as soon as received. It would probably be hoisted on board in sealed containers and treated so that the entire operation would be without disagreeable odors. It is believed that ships suitable for this purpose can be bought from the Federal government at very reasonable prices. Probably five or more would be required for this purpose.

Mr. MacStay believes that the existing Staten Island garbage plant could be so operated as to be wholly unobjectionable, if about \$250,000 were spent in increasing its capacity. Although he did not say so, it is probable that the reason for not immediately deciding upon this is not so much because of the expenditure involved as because of the certainty that any effort to start the plant again would be met by immediate and vigorous protests, injunctions and other moves both legal and political, which would place the city officials in an awkward position and delay the use of the plant indefinitely.

#### LAYING CONCRETE PAVEMENT IN FREEZING WEATHER.

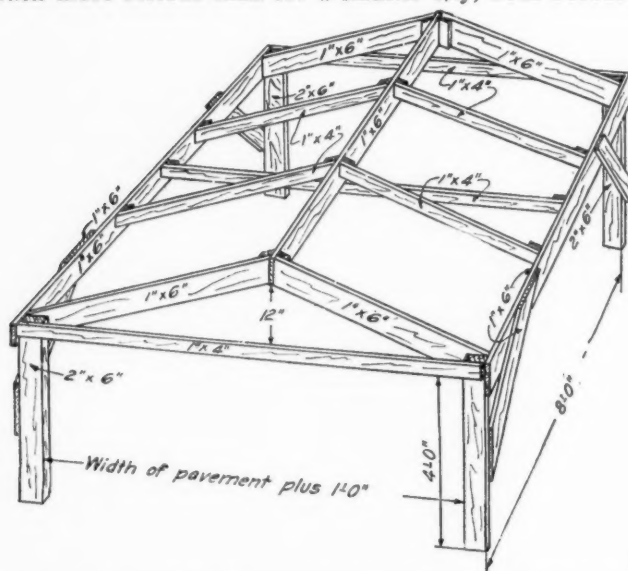
In the coldest parts of the country, almost continuous freezing weather has probably stopped the laying of concrete pavements for the winter; but in the middle latitudes it may still be continued for a few weeks, while further south it may be continued throughout the winter. Some precautions to be observed when the thermometer falls below freezing are given by the Portland Cement Association, the more important being as follows:

Construction of concrete pavements during extremely cold weather is not recommended.

Aggregates and mixing water should be heated so that the concrete, when deposited on the subgrade, has a temperature not less than 80 degrees.

While curing, the loss of heat must be retarded by use of hay, straw or canvas.

For heating aggregates, rotary heaters will pay on large jobs, of the type used for heating aggregates for asphalt paving. Or sand and stone can be heated rapidly by jets of live steam directed into the piles as the materials are loaded into the cars or trucks conveying them to the mixer; but if the haul is long it may be necessary to heat them after they reach the mixer. Where the materials have been delivered along the subgrade ahead of the mixer the piles can be heated by live steam jets or pipe heaters;



FRAME TO BE COVERED WITH CANVAS FOR PROTECTING CONCRETE PAVEMENTS.



the latter usually taking the form of a boiler smoke stack or other length of steel pipe laid on the ground, around and over which the aggregate is piled and inside which a fire is built, using any available fuel. Too great heat must be avoided, as it may injure some materials such as flint and quartz gravel.

For heating the mixing water, the most convenient method is by use of portable furnaces, which contain coils around which the fire is built, through which coils the mixing water passes. Two Londelius heaters used last year on road work near Buffington, Ind., raised water from 40° to 135°, and even to 180°, one for a two-sack batch mixer placing 300 sq. yds. of pavement a day, the other for a mixer of half that capacity. On this work concrete was placed at 75° to 85°, while the air temperature ranged from 4° to 43°.

It is of vital importance that the concrete should not cool below 45 degrees for at least ten days, and the higher it is kept above this the better. If a foot or more of straw is spread on the newly placed concrete and covered with canvas, the initial heat will be retained for some time and frost will not penetrate for weeks if the temperature does not fall very low, especially if snow falls and lies on the canvas. The canvas must be held down by earth banked along its edges or otherwise. Manure should never be used in place of straw, as it stains the concrete and acids of decomposition may pit the surface. Sawdust also may stain the concrete.

Better still, especially when the temperature falls much below freezing, is the use of canvas covered frames placed over the pavement, inside of which burning salamanders, lighted lanterns, or steam coils are placed to supply heat. One such frame was described in our issue of November 15th. Another is shown in the accompanying illustration. The canvas may be supported on a frame composed of 8-inch planks on edge, spanning the road at intervals of about 5 feet, their ends supported on stones or stakes so that they do not touch the concrete, and, resting on the tops of these planks and nailed to them, five or six lines of 4-inch boards laid lengthwise of the road.

## A STUDY OF BITULITHIC IN SEVEN TEXAS CITIES.

### Result of Investigation by the Texas Engineering Experiment Station—Grading Aggregate—Bitumen—Maintenance—Specifications.

The Texas Engineering Experiment Station was organized in 1914 as a part of the Agricultural and Mechanical College of Texas. It has issued twenty-two bulletins, of which fourteen have dealt with highway subjects. Bulletin No. 22, recently issued, deals with bitulithic pavements in Texas, the information having been "obtained through an investigation of existing bituminous pavements in several Texas cities." The investigation included also sheet asphalt, rock asphalt and Topeka, which will be dealt with in a later bulletin. The discussion of bitulithic "is published separately because of the fact that many of the principles involved in this type of surface are applicable only to this pavement." The following synopsis of the bulletin gives only the general statements and summaries. The sixty pages of the bulletin give details, illustrations, tabulated data and other matter, which will repay study by those specially interested. The investigation was made by Roy M. Green, associate professor of highway engineering, under the direction of J. C. Nagle, director of the experiment station.

There is probably no type of pavement which is so greatly influenced by local conditions as that of bituminous construction, since the success or failure of the work depends not only upon the traffic and climatic conditions, but upon every peculiarity of the materials that may be used. Since more than ninety per cent of the materials forming the pavement are from local sources, it would seem self-evident that each locality has a pavement problem which must be studied and solved more or less independently of what may be done elsewhere.

In order that the information might be truly represen-

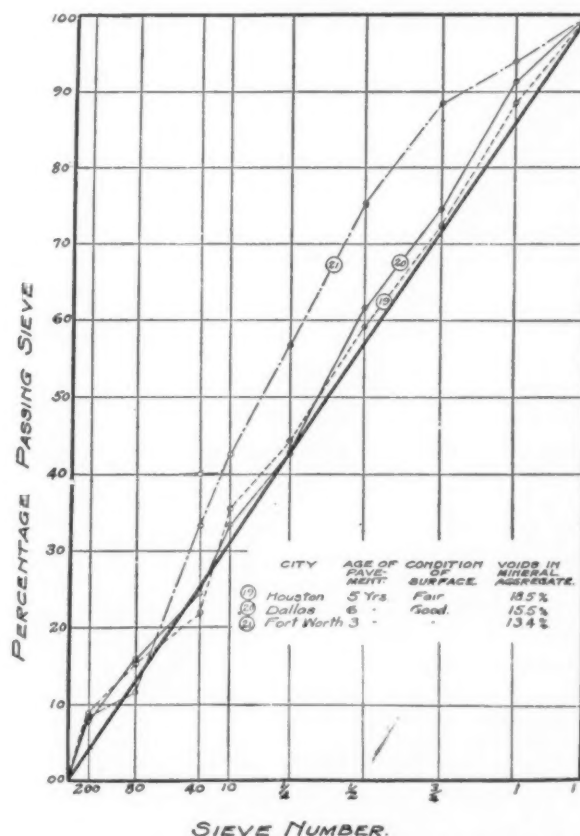
tative of conditions in the state of Texas, and of materials found locally available, samples were obtained from the larger cities of the state, representing the various geographical sections. This made it necessary to obtain the co-operation of the various engineers representing those cities, which was gladly given in all instances.

Samples were selected from the most successful bituminous pavements in several cities of the state. As much information as possible was obtained from the city engineer, concerning the history of the pavements sampled and the materials used in their construction. Also, examples of pavements which have been complete or partial failures were taken, in order to study the difference between them and the more successful ones.

Material as taken from the street was tested for specific gravity, toughness (Page impact machine), and bitumen content; the mineral aggregate was tested for specific gravity, mechanical analysis, and the character of material; the extracted bitumen was examined for bitumen soluble in carbon tetrachloride and insoluble in 86° B. paraffine naphtha, fixed carbon, penetration at 32°, 77° and 115°F., loss by evaporation, 20gm., 5 hrs., 325°F., and penetration after evaporation test, 77°F. From these data were calculated the absolute specific gravity, percentage of voids in the mixture and in the mineral aggregate, and the rational percentage of bitumen.

"Bitulithic, as now constructed, consists essentially of a layer of dense asphaltic concrete, covered, while still hot and before compression, with a mixed seal coat. By this method all the advantages of the aggregate are obtained; that is, the mixture has maximum stability, and none of the disadvantages of the old method are to be found, for the large aggregate is protected from the wear of traffic by the mixed seal coat and the surface is made as nearly water proof as possible."

The desirability of using a hard and tough stone cannot be emphasized too strongly, both because internal



MINERAL AGGREGATE PLOTTED ON THE IDEAL BITULITHIC GRADING.

wear is thereby reduced and also because the absorption of water by the aggregate is decreased.

**Grading of Mineral Aggregate.**—In addition to being tough and hard, the large aggregate must be graded in size so as to give the maximum density, as this will also give the greatest stability to the mixture. This more or less stable mixture of large aggregate should be embedded in a bituminous mortar of such proportions that it will reinforce the large aggregate, prevent internal wear as much as possible, and at the same time produce a waterproof mixture. The proportions of such a mortar are the same as that for the standard sheet asphalt mixture for heavy traffic, as such a mixture is sufficiently rigid to withstand the distorting action of traffic and at the same time furnishes a waterproof surface.

The ideal bitulithic grading would then be one composed of a large aggregate (above the 10-mesh sieve) conforming to Fuller's curve for maximum density, and a fine aggregate conforming to the standard sheet asphalt grading for heavy traffic. Based upon the foregoing principles, such a grading would be as follows for an aggregate having a maximum size as indicated in each case:

Maximum size of aggregate .....	¾"	1"	1½"
Passing 200-mesh sieve.....	5.1	4.8	4.5
Passing 80-mesh and retained on 200-mesh sieve.....	10.3	9.6	9.0
Passing 40-mesh and retained on 80-mesh sieve.....	13.6	12.8	12.0
Passing 10-mesh and retained on 40-mesh sieve.....	6.4	5.9	5.6
Passing ¾-inch screen and retained on 10-mesh sieve.....	16.8	13.3	11.5
Passing ½-inch and retained on ¾-inch screen.....	23.9	17.8	14.4
Passing ¼-inch and retained on ½-inch screen.....	23.9	17.9	14.4
Passing 1-inch and retained on ¾-inch screen.....	..	17.9	14.3
Passing 1½-inch and retained on 1-inch screen.....	..	..	14.3

In order to compare the grading of the mineral aggregate in the various samples with the ideal grading given above, it is necessary to group them according to the maximum size of particles found in each. The comparisons can best be made by the use of the plotted curve.

In studying the grading of the aggregate there are three important factors to consider: namely, first, percentage of 200-mesh material; second, percentage of material passing the 80-mesh sieve and retained on the 200-mesh sieve, and, third, percentage of material retained on the 10-mesh sieve.

**Absorption of Water.**—A bitulithic wearing surface mixture has a higher specific gravity and lower percentage of voids than any other bituminous mixtures on account of its high percentage of stone. Regardless of this high specific gravity and low percentage of voids, it absorbs water more readily than any other type of surface, unless the surface is effectually covered by means of a mixed seal coat. Since water has a very destructive effect on all bituminous materials, this fact becomes a very important factor in governing the life of such a pavement.

In order to reduce the absorption of water to a minimum it is necessary to have sufficient bitumen in the mixture to thoroughly coat all particles. Great care should also be used to select a large aggregate which will absorb the least amount of water, and the aggregate should be carefully graded so that the voids in the mixture are as small as possible. In addition to these precautions it is absolutely necessary to keep the top surface covered with a mixed seal coat at all times.

Test cylinders of bitulithic, Topeka mix, sheet asphalt and Uvalde rock asphalt, cut from existing pavements and stored in water for a month, showed absorption in pounds per square yard as follows: One day—bitulithic, .1755; Topeka, .1174; sheet, .0957; rock asphalt, .0310. One month—bitulithic, .3055; Topeka, .4421; sheet, .4233; rock asphalt, .1280. After being in water one day and in dry air for one day, they retained .213, .0128, .0137, and .0000, respectively, in the above order.

Of 32 samples of bitulithic tested, the percentage of voids varied from 12.1 to 20.5, or less than 21 per cent,

the maximum set by the tenth claim of the bitulithic patent. Also, in nearly all samples of Topeka mix tested, the voids were below 21 per cent.

Additional points were the following:

Much of the large aggregate now being used in bitulithic construction is very poor, therefore the quality of stone should be specified for all future construction.

The toughness and malleability of the bituminous mortar are influenced by the percentage of filler.

#### GENERAL CONCLUSIONS.

The conclusions concerning the bitumen were summarized as follows:

**Bitumen.**—1. The logical way to determine the correct percentage of bitumen to be used in any mixture is to separate the aggregate on the 10-mesh sieve and determine the percentage of bitumen which is necessary to coat each part. The results obtained from such determinations furnish sufficient information to calculate the correct percentage of bitumen to be used in the finished product.

2. The percentage of bitumen usually given in typical specifications in various text-books is excessive.

3. A reasonable limit for the percentage of bitumen to be specified is from 5 to 8 per cent.

4. No particular brand of asphalt is so much superior to others that a city is justified in eliminating all materials with the exception of one by means of closed specifications.

The other points are summarized under three heads:

**Seal Coat.**—1. A seal coat of appreciable thickness is necessary in order to keep a bitulithic pavement in such a condition that it will be able to withstand the action of traffic for a long period of years.

2. The original flush coat method of sealing the top surface is only of value for a short time, as the aggregate used in it is soon swept away. It does not protect the large aggregate from the shocks of traffic because of its small depth.

**Maintenance.**—1. The causes of deterioration of bitulithic pavements which may be guarded against by proper maintenance methods are usually the results of surface wear or the action of water on the mixture.

2. The maintenance method commonly used to protect a pavement from surface wear, known as "Double Re-flushcoating," is of value only for a short while. A better method would be to seal-coat the surface with the same type of seal coat as is now used in the original construction.

3. Hand samples of the pavement should be obtained as often as possible so that the condition of the surface may be known at all times and the destruction of the pavement due to internal conditions be guarded against.

**Specifications.**—1. The present specifications for bitulithic are not satisfactory because they do not describe the materials that are to be used, nor the finished pavement that is to be produced. They also take the responsibility for success out of the hands of the city engineer, who must again be given the responsibility for their condition after the expiration of the guarantee period.

2. The properties of the aggregate should be described in the specifications in order to insure successful results.

3. The properties of the asphalt cement to be used in the pavement should be described in the specifications.

4. The formula to be used in the construction of the pavement should be given, rather than simply to have the properties of the finished pavement described in relative terms, as is now the case.

5. The "Mixed Seal Coat Method" should always be specified in preference to the old "Flush Coat Method."



6. A guarantee should not be expected of the contractor, as it damages rather than benefits the city and is not fair to the contractor.

### BITUMINOUS MACADAM VS. CONCRETE PAVEMENTS.

In August last F. S. Greene, New York State Commissioner of Highways, published in one of the engineering periodicals an article citing cost figures from the records of his department, and stated his conclusion that "From all available data, there is no doubt that at the end of 8 or 10 years of service, depending upon the amount of traffic, the concrete pavement is the most economical one that can be constructed." This conclusion is discussed below by F. P. Smith, of the firm of Dow & Smith, consulting paving engineers and chemists.

Editor, Municipal Journal and Public Works,  
New York City.  
Sir:

An article has been written by Commissioner Greene, of the New York State Highway Department, comparing the cost of concrete and of bituminous macadam pavement to the great advantage of the former, which article has been quoted in a number of technical papers.

1. In this article he cites excerpts from New York State statistics to prove the high cost of maintenance of macadam highways, but, unfortunately, does not very clearly differentiate between water-bound and bituminous macadam. Most of his bituminous macadam statistics cover a period of six and a half years.

2. Based on these data he concludes that both water-bound and bituminous macadam are unsuitable on through routes in New York State.

3. He next cites the cost of repairs to concrete roads in New York State during a much shorter period, computed from statistics admittedly covering a much smaller mileage.

4. This is followed by a comparison of costs of construction and maintenance of the three types mentioned.

5. His conclusion is as follows: "From all available data, there is no doubt that at the end of eight or ten years of service, depending upon the amount of traffic, the concrete pavement is the most economical one that can be constructed."

It has been conclusively demonstrated that water-bound macadam roads will not sustain heavy automobile traffic and that the cost of maintaining them under this kind of traffic is prohibitive. This conclusion is generally accepted by engineers and is concurred in by the writer and no attempt therefore will be made to discuss in detail his water-bound macadam figures. I feel, however, that Commissioner Greene's statistics on which he states that his conclusions are based are very misleading and should be carefully weighed and analyzed before his conclusions are accepted.

Maintenance charges for any type of pavement are of little value unless coupled with a record of the kind and density of traffic. This information is not given in connection with the tabulated cost and maintenance data on which Commissioner Greene's calculations are based, nor does he distinguish between water-bound and bituminous macadam. In order to make such distinction, the writer has consulted the New York State records, from which he has obtained the information given below concerning the individual roads cited by the commissioner.

The selection of the bituminous macadam pavements for the comparison is manifestly unfair. Of the 46.13 miles cited, more than 40 per cent have been reconstructed or resurfaced, while of the entire 3,000 miles in the state highway system, only about 100 miles, or 3 1/2 per cent, have required such treatment. The maintenance cost of the pavements cited is given as \$1,455.99 per mile per year, but the average annual appropriations for maintenance of all roads have averaged just about half this sum, and those for bituminous macadam only about one-third of it.

The roads selected, therefore, are far from average or typical. Some were poorly designed or constructed (as are some roads of concrete or any other type). Of the 13 roads cited, 5 were destroyed by the unprecedentedly severe use given them by the army truck trains which

traversed the state in the spring of 1918, while the frost was coming out of the ground. Of \$218,080 total costs charged to maintenance of such roads, \$186,734 was for reconstruction to repair the damage just referred to; leaving for maintenance only an average of \$309 per mile for the six-year period under normal traffic. Most of the other eight were resurfaced within two or three years of acceptance, because of insufficient drainage or foundation. If these reconstruction costs be deducted, the average maintenance charge amounts to only \$511.95 per mile per year.

Another instance of unfair charge is a 7.77-mile road on which \$20,000 was spent in 1917-18 for widening it five feet and banking curves—surely not a fair charge against maintenance. Another case is that of three sections aggregating 13.56 miles, of which 8.71 miles was concrete pavement with a bituminous carpet which required excessively high maintenance and was resurfaced with asphalt macadam at a cost of \$54,109, which was included in the maintenance charge of \$104,030.80.

In making his comparison, the commissioner states that the cost of maintaining bituminous macadam is approximately \$600 per mile per year, and that of concrete \$100; while the annual report of the commission dated January, 1918, gives the costs for 1915-16-17 as \$464 and \$124 respectively. It is not apparent how the commissioner's statement can be reconciled with these official figures.

As regards the figures, the relatively low cost of upkeep of concrete roads is more apparent than real. In 1917 the concrete roads in the state had been laid only one to three years, averaging eighteen months, and the average outlay on any properly constructed road during the first year is very small. On the other hand, the bituminous roads had been in service for from one to eight years, averaging four—almost three times the average age of the concrete roads. The maintenance cost of the bituminous macadam roads included resurfacing some of them, but the concrete roads had been in use such a short time that no resurfacing had been needed. It is a known fact, however, that very few concrete roads have been in service for over six years without resurfacing.

Another point to be considered is that when concrete roads were first constructed, the heavily traveled routes had already been surfaced with bituminous macadam, and concrete was laid only on the more lightly traveled lateral roads.

As the commissioner has used, in his comparison, bituminous macadam projects upon which the maintenance charges were several times the average for the entire state system, it would seem pertinent to cite concrete pavements whose maintenance has been high:

County	Road Number	Length, Miles	Improvement Completed	Total Maintenance
Livingston ....	5273	6.28	11/12/13	\$44,164.76
Livingston ....	5302	6.40	1/15/14	64,340.19
Onondaga .....	672	6.45	1/25/14	49,002.52
Onondaga .....	971	7.69	1/25/14	54,228.52
Onondaga .....	1039	11.10	10/10/13	53,241.68
Onondaga .....	5249	4.84	12/27/12	54,121.26
Onondaga .....	5274	10.51	10/24/13	62,514.18
		53.27		\$382,613.11

The average cost of maintenance of these concrete pavements was \$1,407 per mile per year, compared with the \$1,456 for the bituminous macadam projects used by the commissioner.

As to construction cost, of proposals received by the commissioner this year, those for concrete run \$12,000 to \$15,000 a mile higher than those for bituminous macadam, instead of the \$7,000 estimated by him. Using these figures, with those for maintenance given by the report (\$464 and \$124 respectively), although the latter admittedly favor concrete, we have

	First cost per mile	4% Interest 7 years	Maintenance 7 years	Total Cost
Bituminous macadam..	\$20,000	\$5,600	\$3,248	\$28,848
Concrete .....	35,000	9,800	868	45,668

The writer believes that the service records of concrete roads prove that they require resurfacing at least once in seven years, as opposed to Commissioner Greene's opinion, totally unsupported by any service record, that "first class concrete roads as now laid will last at least fifteen years

before resurfacing is necessary" and his other belief, also unsupported by any service records, that "we can now build reinforced concrete roads which will last certainly for twenty-five years." From 1908 to 1918 the State of Maryland built 285 miles of concrete roads, and J. M. Mackall, chief engineer of the State Roads Commission, says that, "when constructed to maintain heavy traffic, they will require resurfacing and for this work we believe that two-course sheet asphalt pavement is by far the most satisfactory." And concerning the Washington-Baltimore boulevard, he says: "I do not believe any concrete pavement would withstand this traffic for a period greater than ten years." In their twelfth annual report, the supervisors of Wayne County, Mich., state that "the entire mileage of concrete roads of the county has been gone over one or more times this year with tar, torpedo sand and granite chips, making the necessary small surface repairs and tarring the joints and cracks."

In 1909 (when New York State built its first bituminous macadam pavement) and 1910, about 300 miles of this type was constructed, and only about 9 per cent of this has been resurfaced or reconstructed, although some of it was admittedly imperfect. Of 730 miles built in 1911 and 1912, 6½ per cent has been resurfaced or reconstructed. Of this 1,030 miles of bituminous macadam having an average age of seven years, only a little over 7 per cent has been resurfaced or reconstructed. It is, therefore, difficult to understand how the commissioner could feel justified in stating that the average life of this type of pavement is seven years and "cannot be reckoned beyond ten years."

Commissioner Greene estimates the cost of resurfacing concrete at \$16,700 per mile, giving the total cost at the end of seven years as \$62,368. The commissioner's contention that it is necessary to lay a new two-course bituminous macadam 7 inches thick every seven years is absurd, since it is well known that a surface treatment of heavy oil and stone chips about once in three years restores the material worn away by abrasion. The practice of the New York State Department has been to resurface the older pavements with a new asphalt macadam top 3 inches thick, and during the years 1915 to 1917 the average cost of this was \$6,250 a mile. Assuming it would cost \$8,000 per mile at present prices, fourteen years' in-

terest and maintenance, including resurfacing, would give a total of \$43,946 for bituminous macadam and \$73,036 for concrete—a showing greatly in favor of the former.

Another argument in favor of bituminous concrete is that, with the same expenditure, if concrete had been specified for all New York State highway work there would now be not over 4,000 miles of improved highways instead of the 7,400 miles now in use.

There are certain conditions of subsoil or traffic for which bituminous macadam is not the best type, but the experience of New York City with Fifth avenue, which is paved with a 1½-inch sheet asphalt surface, 1½-inch binder and a 6-inch concrete base, indicates that for the heaviest traffic such a pavement, at \$2.50 a square yard, would cost \$23,477 a mile for a 16-foot road and not over \$150 per mile per year for maintenance over a five-year period. During the war the average cost of maintaining such pavements in Washington, D. C., averaged about \$159 per mile of 16-foot roadway. Such a pavement can be completely resurfaced for about \$11,800 and it would be ultra-conservative to estimate that resurfacing need not be done oftener than once in seven years. On this basis, such a pavement would cost \$37,374 per mile for a fourteen-year period, including interest, maintenance and resurfacing. Such a pavement on a properly drained sub-base would carry the heaviest motor traffic without injury to the foundation and would be especially suitable in localities where repair facilities were obtainable.

The commissioner compares the ultimate cost of concrete roads averaging 7 inches in thickness with bituminous macadam roads, many of which consisted of 3 inches of wearing surface on 6 inches of rolled broken stone base—a construction which the writer protested very strongly against in 1909; instead of comparing them with standard sheet asphalt or any approved form of hot mix bituminous surfacing or even penetration surfacing on an adequate foundation. Such standard bituminous pavements have demonstrated that under severe conditions they would have a life of seven years or more, which is as great as can be claimed for concrete on the basis of any service records in existence.

As to the claim that it is economical to build a concrete roadway and, when it needs resurfacing, cover it with an asphalt wearing surface, this practice is not economical, for in order to withstand the shock of heavy traffic the concrete road should be much thicker than a concrete base with an asphalt surface to absorb the shock, and in addition it is necessary to use a much richer and more expensive mixture in a concrete road than in a foundation. The first Biennial Report of the California Highway Commission states: "Regardless of the overlaid trucks, it seems apparent that the concrete base should in all cases have the bituminous tops applied as soon as it can be done. The original idea of the commission, that bare concrete is not a fit material to receive the impact of heavily loaded vehicles, still appears to be sound. Even the thin bituminous carpet is of great aid in distributing the impact."

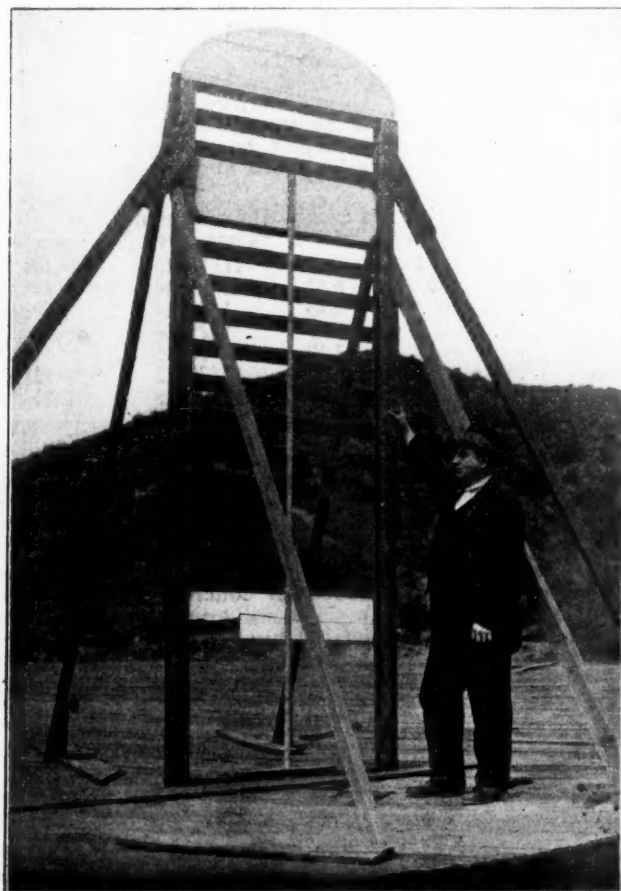
Moreover, by the time the concrete road must be resurfaced, it is far inferior as a foundation to a freshly constructed and cheaper concrete base, as it is cracked to a very considerable extent and probably has numerous surface defects.

Yours truly,  
FRANCIS P. SMITH.

### A RESERVOIR WATER-LEVEL INDICATOR.

The reservoir of the municipal water system of Hollywood, California, is located some distance from the pumping station, on a hill which is very difficult of access. There being no height recorder installed, it has been necessary to make one or two trips to the reservoir each day to ascertain the depth of water in the reservoir.

To remedy this, the engineer has erected on top of the reservoir the indicator shown in the accompanying photograph, so located that it can be seen readily from the pumping station. It consists of two posts about twelve feet high, braced in vertical position and connected by horizontal slats. These slats are so spaced that each interval between them represents 10,000 gallons in the reservoir. A float in the reservoir is connected by a vertical rod with a broad white board, which rises and falls in front of the slats as the water level changes.



RESERVOIR WATER LEVEL INDICATOR.



### AUTOMOBILE FATALITIES.

Ten thousand people a year are killed in automobile accidents in the United States! This was the figure for 1917, and it probably is not less this year. The rate per million of population runs more than twice as high in cities as in rural sections, and the reduction of this high rate is therefore largely a problem for the cities.

That it can be reduced is shown by facts and figures. New York City regulates its traffic more carefully than any other city, and in spite of the crowded condition of its streets its rate of automobile accident fatalities is lower than that of almost any other large city. In 1917 the rates per million population were 92.4 in New York, 93.7 in St. Louis, 112.2 in Providence, R. I., 122.5 in Chicago, 127.8 in Baltimore, 150.4 in Newark, 152.3 in Washington, 165.6 in San Francisco, 172.3 in Buffalo, 248.5 in Detroit, and 281.5 in Pittsburgh. Detroit's rate was lowered to 197.8 in 1918 through a campaign inaugurated by the National Safety Council. Pittsburgh, by a similar campaign, lowered its rate 17 points in 1918, although it had been increasing from 10 to 174 points a year previous to that.

The accompanying diagram shows how the rate has been increasing continuously, being about ten times as large in 1918 as it was in 1908. In the cities of the registration area the number of fatalities increased more than fifteen fold in ten years. Certainly the point has been reached when something should be done not only to stop the increase in rate, but to force it down. If education and traffic regulation will not do it, it may be necessary to provide special features of construction at points of unusual danger—gates to control vehicular traffic, curb fences to prevent pedestrians crossing the roadway between corners, overhead or subway crossings, etc. Each of these ideas has been employed under certain conditions, but a general adoption of them would be very expensive. Even so, when one city is losing more than a thousand citizens a year from this one cause, an expendi-

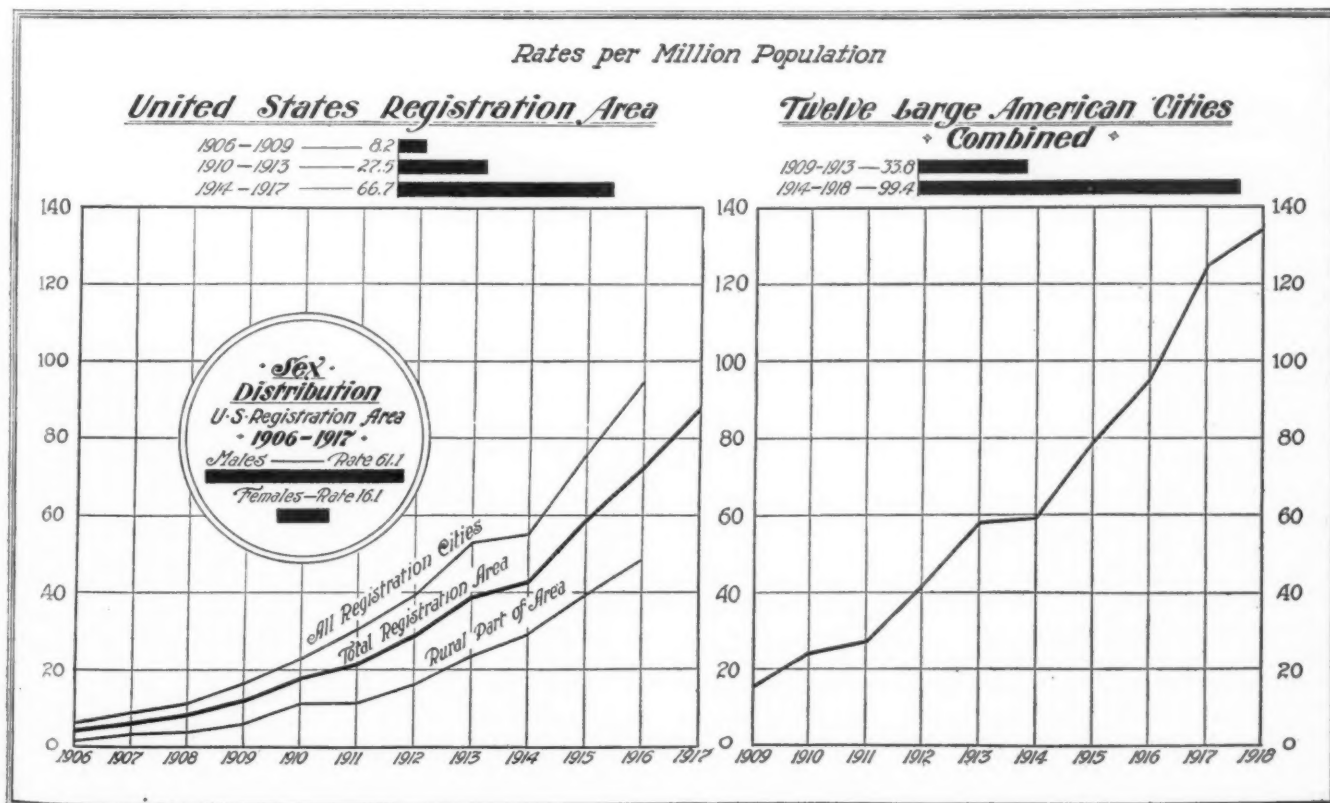
ture of even two or three million dollars a year to cut the rate in half is warranted from a mere dollars-and-cents point of view, considering each life worth \$5,000.

### GUARANTEES FOR PAVEMENTS.

In the issue of Municipal Journal for March 8, 1919, we published a report of the "Committee on the Economic Status of Guarantees for Pavements on Roads and Streets" of the American Road Builders' Association. At the annual meeting of this organization in November, 1919, this committee presented a final report, supplementing its previous report by a discussion of the criticisms and suggestions which had been elicited by the former report and recommending certain changes suggested thereby.

It had been suggested that the committee indicate what it considers a proper period of "reasonable life without repairs" for various kinds of pavement under different conditions. An effort to compile a table covering all possible conditions showed that the wide variations involved would render the figures worthless. "Each set of conditions must be given individual consideration, and the committee believes that the determination of such reasonable periods in any particular case would not be extremely difficult and that any competent engineer can do this satisfactorily."

Several members had objected to the committee's recommendation that the guarantee bond be supplemented by a cash retainer. The committee defends this recommendation by stating that, as a rule, a municipality has no fund available for repairs and the cash retainer therefore serves two purposes—(1) It tends to bring the contractor back to make the repairs, as he knows he will collect some money toward the expense involved. (2) It gives the municipality cash with which to make the repairs and thus avoids the necessity of going through the



MORTALITY FROM AUTOMOBILE ACCIDENTS, 1906 TO 1918.

formalities and oftentimes the difficulties of securing an appropriation, with all the attendant delays.

On further consideration, the committee believed that reasonably adequate protection would be assured by retaining 5 and 8 per cent on new construction and resurfacing, respectively, instead of the 10 and 20 per cent originally recommended. The committee takes the position that 15 cents per square yard to cover guarantee liabilities may be assumed as a fair average. This sum would result from retaining 8 per cent on a total resurfacing cost of \$1.80 per square yard, or 5 per cent on a total cost for new work of \$3.00 per square yard; these differences in cost explaining the different percentages retained, both giving the same sum of 15 cents. It assumes that the contractor would add this 15 cents to his construction cost plus 10 per cent profit in the bid he makes to the municipality. This sum therefore would not be retained from moneys which had yet to be earned by the contractor or from payments made by him. It cannot therefore be justly held that retaining this sum is a curtailment of the contractor's working capital. This amount, while sufficient to cover ordinary defects in workmanship and insure the making within a reasonable time of necessary repairs, would be totally insufficient to cover extensive repairs rendered necessary by serious defects or failure of the work, and protection against these would be assured by the guarantee bond.

The committee conceded that the criticism of its provision for forfeiture of all retained moneys in case of failure to make ordered and necessary repairs is too drastic, and modified its report by providing that the city may make these repairs at the expense of the contractor and deduct such expense from the retained money; recovering from the securities any amount by which the cost of such repairs may exceed the amount of retained money.

The committee consisted of Francis P. Smith, chairman, J. J. Hill, C. M. Pinckney, J. H. Wait and T. J. Wasser.

### WATER PURIFICATION AT NEW ORLEANS.

The annual report for the year 1918 of the Sewerage and Water Board of New Orleans has recently reached this office, and from it we have selected some of the most interesting facts and figures which are given herewith.

The revenues from water rates amounted to \$713,949.60. This was an increase of \$114,000 over 1917, the increase being due to revision of regulations as to free allowance of water for sewerage and allowance for leaks and to an increase in the use of water by various federal government departments. But this increase was fully equaled by the increase in cost of labor and material required for operation and maintenance.

As the year 1918 closed the first ten years of operation of the water purification stations, tables were given summing up the operating figures for this period. Among the figures for this period are the following: Turbidities—maximum: river, 3,000; effluent of grit reservoir, 2,150; effluent of coagulating reservoir, 1,700; filter effluent, 45 (abnormally high, due to freeze in 1918). Minimum: river, 30; effluent of grit reservoir, 35; effluent of coagulating reservoir, 1; filter effluent, 0. Average: river, 600; effluent of grit reservoir, 550; effluent of coagulating reservoir, 32; filter effluent, 0.

Alkalinities—maximum: river, 192; effluent at coagulating reservoir, 88; filter effluent, 99. Minimum: river, 50; effluent of coagulating reservoir, 25; filter

effluent, 20. Average: river, 97; effluent of coagulating reservoir, 45; filter effluent, 38.

Incrustants—Maximum: river, 50; filter effluent, 53. Minimum: river, 5; filter effluent, 6. Average: river, 19; filter effluent, 23.

Bacteria—Maximum: river, 41,000; effluent of grit reservoir, 50,000; effluent of coagulating reservoir, 12,000; filter effluent, 3,200. Minimum: river, 95; effluent of grit reservoir, 40; effluent of coagulating reservoir, 5; filter effluent, 1. Average: river, 2,300; effluent of grit reservoir, 2,200; effluent of coagulating reservoir, 475; filter effluent, 25.

At the large station, known as Carrollton, the total cost of operation for the year 1918 was \$8.43 per million gallons, of which \$3.07 was for attendance and supervision; 28 cents for labor unloading, crushing and storing chemicals; \$3.75 for lime, 75 cents for iron and 11 cents for liquid chlorine; 20 cents for supplies and miscellaneous and 27 cents for labor and material furnished by the pumping station. In addition, \$8,780 was spent in the care and maintenance of the parks and grounds. Wash water, including all pumping costs, cost 6.8 cents per million gallons of water filtered. The cost of all water for cleaning reservoirs was 9.2 cents per million gallons of water filtered, excluding treated water which was wasted in draining the reservoirs for cleaning. Adding the cost of pumping, the net cost of filtered water pumped was \$20.50 per million gallons.

The total gross cost of delivering filtered water to the distribution system, at the plant, exclusive of interest and depreciation charges and based on quantities actually delivered, was \$20.76 per million gallons, or \$22.53 if the betterments and care and maintenance of the park and grounds are included. None of the above figures allow for interest, depreciation or general and overhead expenses.

At the smaller station, known as the Algiers, the cost of treatment was \$24.61 per million gallons, of which \$17.10 was for labor, attendance and supervision and \$5.90 for chemicals.

Cleaning the reservoir cost \$3,925, or 33.1 cents per million gallons of water treated, or 8.4 cents per cubic yard of dry material removed. The amount of wet mud removed was 140,000 cubic yards, estimated to be equivalent to 47,000 cubic yards of dry material. In cleaning, there were used 41,000,000 gallons of raw water, 55,000,000 gallons of treated water, and 8,000,000 gallons of filtered water. The labor employed in cleaning the reservoir system totaled \$2,855.

A table was given showing the average chemical and bacterial composition of the Mississippi river water before and after softening and purification. There was no change in the free ammonia, nitrites and nitrates, chlorine, oxygen, alumina, sodium or potassium. Albumenoid ammonia was reduced from .350 to .035; oxygen consumed from 7.01 to 1.5; alkalinity from 97 to 41; incrustants were increased from 22 to 25. Suspended solids were reduced from 650 to 0; dissolved solids from 190 to 100; half-bound carbonic acid from 42 to 0; free carbonic acid from 8 to 0; color from 10 to 5; turbidity from 600 to nothing; silica from 11 to 10; iron oxide from .13 to .05; calcium from 38 to 15; magnesium from 8 to 3; sulphuric anhydride increased from 19 to 21. Before treatment there was a very slight earthy odor, but none whatever after treatment. The bacteria per c.c. on gelatin 20 degrees, 48 hours, were reduced from 2,600 to 31 between the years 1909 and 1913. Since then, agar 37 degrees, 24 hours, has been used and the bacteria on this basis reduced from 1900 to 17.



# The WEEK'S NEWS

Spending Michigan's \$50,000,000 Road Fund—New England Has Weekly Weather Road Map—Pennsylvania to Keep Roads Open—Border Guarded Against Smallpox from Canada—Mileage of Sewers in Pennsylvania Cities—Richmond, Ind., Water Rates Increased—Detroit to Classify City Employees—Illinois Taxes Bridge of St. Louis, Mo.—Valuation of Pittsburgh Street Railways—Chicago Fighting for Five Cent Fare and City Ownership of Street Cars.

## ROADS AND PAVEMENTS

### Financing Michigan's New Highways.

Lansing, Mich.—Issuance of another \$2,000,000 in short term notes by the state for use of the highway department in the big road building program has been authorized by the state highway loan improvement board. This will make a total of \$4,000,000 in state securities issued under the constitutional amendment adopted last April, which enables the state to expend \$50,000,000 for the improvement and construction of trunk line roads. They will be due in four months after date, and at that time will be paid from the proceeds of long-time bonds to be issued early in the spring. The state highway department is now paying for the work done this year. Probably 85 to 90 per cent of the road contractors are completing their work now and are anxious to get their money. The \$500,000 worth of state notes issued some time ago have been taken up, being paid from the sale of the \$2,000,000 worth of highway bonds sold. State treasurer Gorman plans to issue \$3,000,000 of these bonds next spring, which will round out the \$5,000,000 which it is planned to expend each fiscal year until the road building program has been completed. After the first of the year one-half of all automobile license money which goes to the highway department for road improvement and building, will begin to come in, so there will be no shortage of funds at any time. This source netted the highway department more than \$1,600,000 for the last year.

### Weather Road Map for New England.

Boston, Mass.—The first weekly weather road map and data relating to the condition of highways throughout New England, has been issued from the Boston branch of the Weather Bureau. It indicates much work in putting out information which should prove of great value to pleasure and business traffic. Practically all main routes of traffic from Maine to Rhode Island have been covered in the summary of prevailing conditions of highways, while there also is forecasted the probable conditions of roads for the weekly period. The new service consists of a map of New England, forecast and present condition of highways. During the winter the amount of snow in different sections will be designated by clear spaces, where the covering of snow is less than four inches; single lines where the snow is four to eight inches deep and criss-cross lines where the depth is more than eight inches. The first map has no cities to help give a more definite idea of locations, but the chief cities of New England will be marked in succeeding maps. Reports are grouped first by states and then as lines radiating out from the most prominent cities in these states, and then listed from these cities clockwise to compass directions. All through lines run from Boston. Main-traveled highways only, as suggested by the respective highway commissions, are reported.

### Main Pennsylvania Roads to Be Kept Open.

Harrisburg, Pa.—The state highway department has announced that it has completed plans whereby all of the main connected hard-surfaced highways will be kept open for winter traffic, particularly those sections where motor trucks can be used for the transportation of farm products to the centers of population. The department has is-

sued the following statement: "From experience gained during the severe winter of 1917 and 1918, the department made extensive plans to take care of snow removal operations during the season of 1918 and 1919. The intention was to use snow plows attached to department trucks, as well as road machines and wooden drags. However, it was necessary only once during the winter of 1918 and 1919 for the department to attempt snow removal. For the coming winter's operations the department has purchased ten snow plow truck attachments in addition to the sixteen already on hand. There are 225 road machines, property of this department, which will be transferred to the main lines of travel. The district organizations will handle this phase of the work, as they do the department's general maintenance operations. We are transferring our truck equipment to those particular highways which must be opened as quickly as possible after a snowfall. The road machines will be used on highways of secondary importance and supplementing the truck equipment. There is a caretaker on each section of from five to six miles in length, and he is given authority to hire additional labor if circumstances warrant."

## SEWERAGE AND SANITATION

### Court Says Tuberculosis Hospital is Not Health Menace.

New Orleans, La.—In a suit to enjoin the city from establishing and maintaining a tuberculosis hospital in the city, one of the objections of the plaintiffs, who lived in the vicinity of the proposed site, was that the hospital would endanger their health. The state supreme court did not take this view. The court said in part: "If it were proved with certainty that this hospital would endanger the health of this plaintiff or his family, perhaps a case might be presented for judicial interference. But the very opposite is conclusively shown by the evidence, which is all one way to the effect that a well-kept tuberculosis hospital is not a menace to the health of the people living in its vicinity; and the presumption is that this hospital will be well kept. \* \* \* Our conclusion is that the suit is groundless in so far as it is sought to be founded on the apprehended injurious character of the proposed hospital."

### Border Quarantine Against Smallpox from Canada.

Niagara Falls, N. Y.—W. R. Baldwin, immigration officer in charge of the Niagara Falls immigration bureau, has received orders to enforce the border quarantine which has been declared by the United States Public Health Bureau on account of the prevalence of smallpox in Toronto, and other cities of the Province of Ontario. C. H. Gardner, surgeon of the United States Public Health Bureau, in Buffalo, announced the quarantine. A staff of physicians and nurses has been stationed at the immigration offices at the American ends of the bridges, as well as at headquarters office at the Tenth street railroad station. According to Inspector Baldwin's announcement, "every person traveling from Ontario to the United States must show either a certificate of recent vaccination or that he has had the disease. Certificates to be valid must be on the printed stationery of the physician issuing them or be issued by the government of the city under whose authority the vaccination was done. Travelers from the United States

in to Canada and back should be vaccinated before starting from this side. Vaccination will be performed free of charge at the immigration offices at the American ends of the bridges and at our headquarters office at the Tenth street station. Persons living in non-infected cities of Ontario, who have frequent business in the border cities of the United States can, upon establishing their identity, be provided with identification cards permitting them to cross the border without being subject to the vaccination order. Such cards are invalidated, however, by a single visit to an infected city." The announcement of Dr. Gardner sets forth that through passengers come from points in the United States through Canada to other points in the United States who do not get off the train in Canada will be passed on their through tickets. Persons living in the United States and having frequent business in Canada to points not infected will be able to arrange for identification cards with the immigration officers at the border, the cards to be made in triplicate and a passport size photograph in triplicate provided. It is reported that there are about 4,000 smallpox cases in Ontario.

#### Forced Closing During Epidemic Held Invalid.

Paterson, N. J.—Measures taken during last year's influenza epidemic in closing saloons have been declared invalid. The defendant was convicted in the lower court for inviting and allowing people to congregate in his saloon while influenza was epidemic in the city, it being charged that such action was dangerous to human life and health. The section of the ordinance under which he was convicted read as follows:

That whatever is dangerous to human life or health, whatever building, erection, or part or cellar thereof is not provided with adequate means of ingress and egress or is not sufficiently supported, ventilated, sewerred, drained, cleaned, or lighted, and whatever renders the air, food, or water unwholesome, are declared to be nuisances and are prohibited. Any person violating any of the provisions of this section shall be liable to a penalty of not less than \$5 nor more than \$100.

The Supreme Court of New Jersey decided that the ordinance was too indefinite to support the conviction, and that the complaint in the case charged no violation of the ordinance. Legal enactments specifically requiring the closing of schools and places of amusement during an epidemic have been upheld by the courts, according to the U. S. Public Health Service, which finds in this case an example of the necessity for drafting health legislation in a clear and definite form.

#### Sewer Mileage in Pennsylvania Cities.

Harrisburg, Pa.—According to a report just compiled by J. Herman Knisely, chief of the bureau of municipalities of the Department of Internal Affairs, Reading leads the third-class cities of Pennsylvania in the matter of miles of constructed sewers, having a total of 180 miles. Coatesville, a much smaller city, has the least, with 7.5 miles. Most of the cities of the third class have both sanitary and storm sewers, constructed separately. These cities include Chester, Connellsville, Easton, Erie, Harrisburg, Hazleton, Johnstown, Lock Haven, McKeesport, Monongahela, Pittston, Titusville and Wilkes-Barre. Reading's big sewer mileage is due to the fact that it has a double sewerage system. Wilkes-Barre, with 131 miles, is second among the third class cities in the length of its sewers, Erie is third, with 118 miles; Altoona, fourth with 91 miles; Harrisburg fifth, 90 miles; New Castle, sixth, 89 miles. The cost of approximately 1,500 miles of sewers now existing in the third class cities of the state, has already gone far into the millions of dollars, the report of the bureau of municipalities shows. Reading's system is reported as being worth \$2,408,373, while that maintained by Wilkes-Barre cost between \$1,500,000 and \$2,000,000. Sewer costs in Harrisburg have reached \$1,750,000 and in Johnstown \$1,167,324 has been expended for that purpose. The cost in Altoona, the report shows, has been \$1,500,000. Four third class cities, the report sets forth, maintain sewage disposal plants. They are Altoona, Lebanon, Reading and York. The Altoona plant cost \$215,141; the one in Lebanon, \$75,000; that in Reading, \$426,324; and the York plant \$85,000.

## WATER SUPPLY

### Borough Not Allowed to Build Competing Water Works.

Kittaning, Pa.—The state public service commission has refused permission to the borough to build a water-works plant that would duplicate the works of the Armstrong Water Co. The commission holds that a duplicate plant would be an "economic loss" and would give "more or less inadequate service" until one or the other works was forced out of business. The commission also declares that the company has not "performed its duty" and should immediately improve its works.

### Water Rates Increased by Commission.

Richmond, Ind.—Authority for a 7 per cent. increase in rates is contained in an order the state public service commission has issued in the case of the Richmond water works' appeal for more revenue. The increase is to be uniformly applied. Meter rate increase are to go into effect December 1 and flat rate increase April 1. Minimum charges remain unchanged. In previous order the commission authorized the company to establish rates to yield a return of 6½ per cent. on the \$850,000 valuation of the plant, as estimated by the commission for rate-making purposes. The company in its recent case was able to show that it is not earning the rate permitted. The commission figured that a 7 per cent. uniform increase will yield the company the full 6½ per cent. The company asked the commission for authority to increase its common stock \$25,000, which was alleged to have been put into betterments and additions. This would have established an \$875,000 valuation instead of the \$850,000 valuation, on which the rate of return is to be figured. The commission, however, did not find that the claim of the company is substantial and declined to grant permission for the additional stock issue.

## STREET LIGHTING AND POWER

### Determines City Payment for Distribution System.

Redding, Cal.—A decision of the state railroad commission fixing the compensation to be paid by the city for the distributing system of the Northern California Power Company in that city answers the company's criticism of the commission's method of determining the condition of the plant. Declaring that it sees no merit in the criticism, the commission says: "It is desirable that adequate allowance should be made by the commission in rates to take care of depreciation, and such allowance should be surrounded by safeguards which will make certain that they will be used by the utilities for the very purpose for which they are paid by the ratepayers. But, irrespective of whether the allowances are sufficient or insufficient and irrespective of whether they are used properly or improperly, the fact remains that in eminent-domain proceedings it must be the actual condition of the property at the time of valuation that is to be considered, regardless of the actual amount of the original investment, regardless of whether the owner has accumulated a depreciation reserve or not, and regardless of whether the reserve is built up by the sinking fund or straight-line method. The service condition of the plant as a whole is not entirely reflected by the condition per cent. The condition per cent merely reflects the condition of individual plant items as compared with new and takes no account of the general usefulness and efficiency of these working parts in their relation to the working capacity of the entire machine. If we consider the plant in the light of a machine constructed for the purpose of performing a definite service, it is clear that we cannot actually compute the service condition by a consideration alone of the probable life of the separate working parts. Many other considerations enter into such calculations. Besides the wisdom or unwisdom evidenced in the design or plan of the completed plant and the question of the adaptability of the various parts to the efficient and economical per-



formance of the functions required of them, also a consideration of whether the plant has been overbuilt or underbuilt, there may be many factors other than those involved in the cost and the age of the separate parts which have a direct bearing upon operation of the plant, causing it either to be economical and efficient or wasteful and extravagant. It is to be admitted that a machine which is economical and efficient in operation has a greater value than one that is wasteful and extravagant. That this consideration cannot be included in a computation of the age and the cost of the parts composing the plant is evident."

#### State Jurisdiction Over City Serving Outside Bounds.

Pasadena, Cal.—According to a decision by the State Railroad Commission, when this city, which operates a municipal electric light and power plant, went outside the territory defined as the city of Pasadena and sold electrical energy to the Raymond Hotel and other customers in the city of South Pasadena, it became, as other public utilities, subject to the jurisdiction of the commission. This opinion was handed down in the case of the Pacific Light & Power Corporation against the two Pasadenas. Accompanying the opinion is an order directing the city of Pasadena immediately to file with the commission its schedule of rates. The case was presented to the commission through the medium of an agreed statement of facts, the question at issue being solely one of law. The Pacific Light & Power Corporation serves electrical energy in the city of South Pasadena. When its field was invaded by the municipally owned Pasadena plant it appealed to the commission, setting up the contention that in going beyond the limits of Pasadena the municipality had placed itself in the same category as privately owned utilities. The city responded with the claim that the use of the words "private corporation" in the state constitution in describing utilities precludes the Legislature from vesting in the railroad commission any jurisdiction with reference to utility operations of municipalities. Disposing of this claim by quoting from the state constitution and the public utilities act and Supreme Court decisions, the commission says:

These decisions clearly hold that when a municipality engages in a public utility business, certainly in so far as extra territorial service is concerned, the municipality is to be regarded as acting in the capacity of a private corporation or individual and is subject to the same obligations and enjoys the same rights, in so far as its own public utility operations are concerned, as a private corporation or individual engaged in such a business.

We believe the conclusion irresistible, therefore, that the city of Pasadena, in supplying a public utility service to the inhabitants of the city of South Pasadena, must be regarded as coming within the phrase "private corporation and individual or association of individuals" as that phrase is used in Section 23 of Article XII of the constitution, specifically defining certain public utilities to be subject to regulation by the Railroad Commission. It is our conclusion also that this service clearly comes within the definition contained in the public utilities act itself.

## GOVERNMENT AND FINANCE

#### To Classify City Employees' Salaries.

Detroit, Mich.—Council has authorized the civil service commission to make a survey of all positions in city departments in order that a standardization of salaries and duties in various classes might be affected. An appropriation of \$1,500 to cover the cost of clerical work in connection with the survey was also made. The suggestion that such a standardization be made came from city controller Steffens who pointed out the advantages of having employees in the same class under civil service but employed in different departments paid at the same rate. He said the work of estimating salary appropriations for the budget would be greatly simplified. Fred Smith, secretary of the commission declared himself in accord with the plan and announced that the commission would obtain the assistance of Harrington Place, a civil service expert connected with the Bureau of Municipal Research. According to Mr. Smith there exists at present a great diversity of salaries paid in different departments for the same class of work. In other departments the line drawn between different classes is so

slight as to be negligible. This is especially true, he said, in the city engineer's office where there are several classes of draftsmen whose salaries differ but \$20 a year. These classes should be combined according to Mr. Smith. "We have clerks in some departments receiving \$1,000 a year while those in another department, doing exactly the same class of work are being paid \$1500. This is unfair, both to the department and the civil service employee," Mr. Smith said, "for both positions are filled from the top of the eligible list. If it was required to fill the \$1,000 position and then the \$1,500 position later, the applicant standing highest on the list is given the lower paid position. All positions in the same class, regardless of department should be paid on the same basis." A careful study will be made of all the positions classified under the civil service commission, data being gathered from department heads and the employees under them, as to the duties and requirements of each position. From this data the commission will re-classify positions, standardizing each class as to salary and examination requirements. Weekly reports of the progress will be made to the council as, under the charter, all matters relating to salaries of city employees must be referred to that body.

#### St. Louis City Bridge Taxed by Illinois.

St. Louis, Mo.—A suit brought by St. Clair County, Illinois, to compel the payment of taxes by the city of St. Louis, on the easterly half of the municipal bridge across the Mississippi River, has been decided in favor of the Illinois county. The county court held that taxation is proper because the bridge is intended to produce revenue by the lease of its railway deck. The east or Illinois half of the bridge has been valued at \$600,000 by the assessors, and the 1918 taxes on this amount, which were involved in the case, are about \$17,000. The bridge with its present approaches cost over \$6,000,000.

## TRAFFIC AND TRANSPORTATION

#### Variable Methods in Determining Railway Valuation.

Pittsburgh, Pa.—The value for rate-making purposes of the Pittsburgh Railways is \$48,000,000, according to the opinion of the engineers who represented the city of Pittsburgh on the Pennsylvania Public Service Commission's joint valuation board, but a rate base to be just to both parties and unjust to neither should not be less than \$65,000,000 and to give weight to the cost of reproduction should range between \$65,000,000 and \$70,000,000, in the judgment of the men on the board who represent the company. The report has been filed before members of the Public Service Commission in Pittsburgh. The valuation proceedings were begun eighteen months ago with the intention of establishing a definite calculable basis for the computation of an equitable rate of fare. The two engineers of the company on the board estimated that the traction system will need \$18,986,000 for its operation during 1920, and that, to raise this sum, a fare of 8.45 cents is necessary. The two representatives of the city of Pittsburgh declare the railways will need only \$17,446,000 for its operation in the coming year, but to secure this they must charge a 7-cent fare. The present fare is 7½ cents when paid by ticket and 10 cents in case of cash payment. The letter of transmittal to the Public Service Commission briefly summarizes the work of the board, and then goes on to relate the manner in which the valuations were arrived at. The value of the physical property was determined upon by seven different methods. They are as follows:

Basis No. 1—Historical cost as determined upon from the records, with scrutiny of engineers and accountants, representing actual investment in physical property placed in the service of the public, \$59,069,392.

Basis No. 2—Estimated costs of reproduction new at prices ruling when each part of the existing property was constructed, and under original conditions of construction, \$49,324,791.

Basis No. 3A—Estimated cost of reproduction new at average prices of the period 1906 to 1915 inclusive, and under original conditions of construction, \$56,148,398.

Basis No. 3B—Estimated cost of reproduction new at prices indicated for 1918 by the trend of prices for twenty years pre-

vicious to 1916, and under original conditions of construction, \$60,892,200.

Basis No. 3C—Estimated cost of reproduction new at average prices in the period 1914-1918, inclusive, and under original conditions of construction, \$73,560,300.

Basis No. 3D—Estimated cost of reproduction new at the estimated average prices for the period from 1918 to 1922, inclusive, and under the original conditions of construction, \$84,191,300.

Basis No. 4—Estimated cost of reproduction new at prices and under the conditions ruling at the date of valuation, viz., April 1, 1918, \$102,842,274.

No allowances were made by the board for franchise values in excess of cost, nor for earning capacity, nor for terminal facilities, nor for bridge rights in excess of cost, nor for the special value of the charter, which is one of seven said to be the broadest of the kind known. The company placed a substantial value on this charter, but the board denied it. It was on the question of whether "other elements of value," besides the actual physical valuation of the properties, should go into the total, that the valuation board split, the company's engineers opposing the stand taken by the city's representatives on "development values," "going concern values" and similar items. All the engineers agreed that the physical operation of the system required \$14,086,000 next year. To the capital invested the city engineers would allow a return of \$3,360,000, making the total requisite revenue \$17,446,000. To capital the company engineers credited a return of \$4,900,000 a year, thus making their total \$18,986,000. The city's engineers recommended a zoning system of fares, presumably based on that recently projected for trial in Newark, N. J. The board also made a recommendation as follows:

The solution of the railway problem, in our opinion, will not come with the mere setting down of fixed charges that are reasonable under all the circumstances on the amount invested. The real need, in our opinion, is for some contract arrangement between the public and the company, which would be based on the reasonable assurance of securing all necessary charges, including a return on the investment. We are absolutely convinced that a contract relationship should be established at the very earliest moment.

The report makes it plain that all its estimates were made without regard to the recent award of the National War Labor Board, which adds, according to the receiver's figures, \$1,050,000 to the company's annual expenses.

#### Fight for Five-Cent Fare and City Ownership.

Chicago, Ill.—Public ownership of Chicago's surface lines within a period not to exceed three years, is a program which the city administration mapped out. It at once set the machinery in motion moving toward accomplishment of the plan. Corporation counsel Ettelson summarized the plan as follows:

1. Appointment by the mayor of a commission of engineers to study traction conditions and report to the mayor within six months.

2. Establishment of a peoples' transit district, similar in statutory requirements to the sanitary district, which would wield power independent of the city council and enable the issuance of bonds to purchase traction properties.

3. Demand for a special session of the state legislature to pass laws creating the governmental body to be known as the peoples' transit district.

4. After the above legislation is secured, the next step is the holding of a public election, at which the people will vote for candidates to be elected to a board of trustees of this peoples' transit district—as they vote now for trustees on the sanitary district board.

5. This board of trustees then to proceed to condemn traction properties under the right of eminent domain. Such lawsuits have the right of way in the courts.

6. The board of trustees to assume operation of the traction lines as the board of trustees operate the sanitary district system.

Mayor Thompson is appointing a commission of engineers. An appropriation of \$250,000 has been placed at the disposal of the Mayor to get the engineers' work started. The "peoples' transit system," or Ettelson plan, attempts to reproduce the preliminary steps which finally led to the establishment of the sanitary district. It surmounts the bonding limitations of the city by seeking to create an independent taxing body which can issue bonds without regard to the city's limitations, just as the sanitary district does today. Meanwhile the public utilities commission has announced that the 7-cent fare would remain in effect until the state supreme court has given a decision on the legality of the commission's increased fare order. A petition has been filed in the Circuit court by corporation counsel Ettelson asking that the Chicago Surface lines be restrained from collecting 7 cents. The matter was

## LEGAL NOTES

### A Summary and Notes of Recent Decisions— Rulings of Interest to Municipalities

#### Limitation of Municipal Officers' Authority—Recognition by Contractors.

(Pa.) Contractors, in dealing with municipalities, are bound to recognize the limitations upon the authority of the officers with whom they deal.—Union Paving Co. v. City of Philadelphia, 107 A. 370.

#### City Improvements Affect Street Railroad—Liability.

(N. Y. Sup.) Where improvements by city or below surface of street interfere with street railroad's track or structure, the railroad cannot charge the city with the expense of protecting its property or removing or relocating it.—City of New York v. Whitridge, 177 N. Y. S. 122.

#### Ratification of Contracts by Electors—Modification.

(Iowa) Where statute requires ratification of city's contract by vote of electors, city council cannot without such ratification modify contract entered into before enactment of such statute at a time when no ratification was necessary.—Ottumwa Ry. & Light Co. v. City of Ottumwa, 173 N. W. 270.

#### Lien Creditors of Contractor—Recovery Against Surety.

(N.Y.) Where the lien of creditors of a public contractor, under Lien Law, § 5, was simply against any unpaid balance on the contract, and not on the property, the village could not recover against the surety on the contractor's bond, having no personal interest in the unpaid claims, having paid none, and not being personally liable.—Village of Argyle v. Plunkett, 124 N. E. 1, 226 N. Y. 306.

#### Pavement Guarantee—Disintegration of Concrete Base—Wearing of Top Surface.

(Or.) In an action on an undertaking executed by a paving company and an accident and liability company insuring faithful performance of a pavement contract and providing for the repair of defects attributable to defective workmanship or material within five years, the mere fact that the top or wearing surface of the pavement wore out, leaving the concrete base to disintegrate, held not sufficient evidence to justify a finding of defective materials and workmanship.—Dalles City v. Aetna Accident & Liability Co., 182 P. 385.

#### Police Power—City's Right to Remove Wooden Buildings in Fire Limits.

(Cal. App.) City's police power cannot be bartered away by express contract.—Maguire v. Reardon, 183 p. 303.

Building Law, Ordinance of City and County of San Francisco, No. 4170, N. S., authorizing board of public works to demolish wooden building within fire limits upon owner's failure to so do within specified period after notice, is not discriminatory in providing for the general demolishing and removal of wooden building, and not referring to building of other inflammatory material.—Id.

Owner of wooden building constructed within fire limits of city in violation of San Francisco Ordinance No. 1198, passed pursuant to Charter of City and County of San Francisco, art. 2, c 2, § 1, subd. 5, cannot restrain city from demolishing building under Building Law, Ordinance 4170, N. S., regardless of validity of latter ordinance, since such

put up to the public utilities commission with the receipt of an opinion from Attorney General Brundage, in which he ruled that the order of Aug. 4, fixing the fares at 7 cents, could not be modified by the commission, but that a new order, restoring the 5-cent fare, could be issued. The city bases its fight on a ruling made by Judge Smith of the Circuit court of Sangamon county, declaring the 7-cent fare illegal. The street car companies took an appeal and the case is pending in the Supreme court.



building constitutes a nuisance, and equity will refuse any relief designed to perpetuate its maintenance.—Id.

Contracts made by owner of wooden building constructed within fire limits in violation of city and county of San Francisco ordinance No. 1198, with tenants, must be deemed to have been made with knowledge that the building was illegally maintained, and subject to right of city to remove it at any time.—Id.

City's power to remove wooden buildings erected within fire limits is an exercise of the police power, since it immediately concerns the safety of persons and property.—Id.

#### **Lien on Property for Improvement—Platted Land without Streets.**

(Mo. App.) City's right to create lien on property of abutting owner for streets and sewer improvements is not founded upon any pre-existing right, but is in invitum and rests exclusively on a substantial adherence to the method prescribed by the ordinance authorizing it and charter as its basic power.—*Boatmen's Bank v. Semple Place Realty Co.*, 213 S. W. 900.

Where land has been platted into lots and blocks, but streets have not been dedicated, it should be assessed for sewer improvements as one entire tract, and not as separate lots as laid out on plat.—Id.

#### **Levy of Special Improvement by City on County Property.**

(Colo.) Under Const., art. 20, authorizing city to assume powers "of local concern," city which has by its charter assumed such powers has right to levy special improvement tax against county property situated within city; assessments for local improvements being of local concern.—*Board of Com'rs of El Paso County v. City of Colorado Springs*, 180 P. 301.

A city may levy special improvement taxes on county property within the city, and may enforce payment thereof.—Id.

#### **Municipal Dance Hall Regulation Valid.**

(N. Y. Sup.) Municipal ordinance, requiring that dance halls be run by persons of good character, forbidding sale of liquor therein, regulating the age of attendants, forbidding Sunday dancing, and requiring a license, was valid.—*Geyer v. Buck*, 175 N. Y. S. 613.

#### **Extending Boundaries of Small Town—Police and Sanitary Regulations.**

(La.) Though 50 per cent. of the area of a small, growing town is unimproved, it does not follow that there can exist no necessity for enlargement of its boundaries, and even though no such necessity exists, such enlargement may be both advisable and reasonable.—*Bowman-Hicks Lumber Co. v. Town of Oakdale*, 81 So. 367.

Where a small, growing town is surrounded by mills of lumber companies, including the quarters of their employees, touching its boundaries, and people of town and officers and employees of companies live in such juxtaposition as to form a single community, it is reasonable that they should be subject to same police and sanitary regulations, and hence reasonable to extent boundaries of the town to include such mills and employees quarters.—Id.

#### **Provision of Building Code—Injuring Adjoining Building by Excavation.**

(Wis.) Provision of Building Code, § 43, that "no one shall excavate so as to injure any adjoining building," is a change in what would otherwise be the respective rights and liabilities of plaintiff and defendant, adjoining lot owners, and their rights must be determined without regard to the ordinance; there being no express declaration of the Legislature taking away or changing established property rights of adjoining landowners by statute, or delegation of power to common council, under Milwaukee City Charter, c. 4, § 3.—*Hickman v. Wellauer*, 171 N. W. 635.

Ordinances must not be inconsistent with the general laws of the state.—Id.

#### **Pavement in Disrepair—Replacement by Contractor.**

(N.Y.Sup.) Sewer contractor, under contract to replace pavement, is required, in restoring pavement, to put it in good condition, though at time he began work it was in a state of disrepair.—*John J. Creem Co. v. City of New York*, 177 N. Y. S. 229.

#### **Lien on Money Due Contractor from City.**

(Cal. App.) Owner of steam shovel who rents shovel to contractor constructing roadway for city is not entitled to equitable lien upon money due contractor by city for rent due owner from contractor upon giving city written notice that such rent has not been paid, under Code Civ. Proc., § 1184, not having "performed labor or furnished materials" used in construction within such statute.—*City of Los Angeles v. Kautz*, 179 P. 716.

#### **Powers of Municipality.**

(Ala.) A municipal corporation may exercise only the powers granted in express terms, those necessarily applied in or incident to the powers expressly inferred, and those indispensably necessary to the accomplishment of the declared objects and purposes of the municipality.—*Stokes v. City of Montgomery*, 82 So 663.

#### **Ordinance Requiring Sanitary Privy Unreasonable and Invalid.**

(Fla.) If a municipal ordinance directly affecting the rights of individuals is arbitrary and unreasonable, it is invalid, and will not be enforced.—*Cary v. Ellis*, 82 So. 781.

An ordinance requiring a sanitary privy to be constructed and maintained in every house and building in the city in which people live, or where they congregate or assemble, or any kind of business is carried on, is unreasonable and arbitrary, and invalid.—Id.

#### **Continuing Right to Change Charter.**

(Mo.) Cities have a continuing right to make and change their charters.—*Collins v. A. Jaicks Co.*, 214 S. W. 391.

#### **Street Resurfacing Paving, Not Maintenance.**

(Mo.) In a petition to have special tax bills declared invalid, allegations that work had consisted of "putting a top dressing on said boulevard" means resurfacing, which is a paving or repaving, and not merely maintenance.—*Collins v. A. Jaicks Co.*, 214 S. W. 391.

#### **Sovereign Powers of City—Damage Caused by Fire Department—Liability.**

(Ind. App.) A municipal corporation is a government possessing, to a limited extent, sovereign powers, which may be denominated governmental or public; and, such powers being public and sovereign in their nature, such municipal corporation is not liable for a failure to exercise them or for errors committed in their exercise.—*Louisville & Southern Indiana Traction Co. v. Jennings*, 123 N. E. 835.

In extinguishment of fires and in making arrangements therefor, the municipality acts in its governmental capacity and is not liable for damages caused by the negligence of its fire department.—Id.

#### **Restriction on Business—Regulation of Public Filling Stations.**

(Ohio.) Penal ordinances, or those restraining exercise of any trade, occupation, or business, or restricting the use, management, or alienation of private property, will be strictly construed, and not extended to include limitations not therein clearly prescribed, and exemptions from such restrictive provisions are also liberally construed.—*State v. Dauben*, 124 N. E. 232.

Under ordinance forbidding the location, building, or operation of a public filling station in a residence district without written consent of two-thirds of owners within a specified distance therefrom, but exempting the owner or operator of any such station previously erected, he need not procure such consent before repairing or rebuilding such station.—Id.

## NEWS OF THE SOCIETIES

**Dec. 25. AMERICAN SOCIETY OF MECHANICAL ENGINEERS.** Annual meeting, New York City. Secretary, Calvin W. Rice, 29 West 39th St., New York City.

**Feb. 9-13, 1920. — AMERICAN ROAD BUILDERS' ASSOCIATION.** Annual convention, Louisville, Ky. Secretary, E. L. Powers, 150 Nassau Street, New York.

**May 18-21, 1920. — NATIONAL ELECTRIC LIGHT ASSOCIATION.** Annual convention, Pasadena, Cal. Acting secretary, S. A. Sewall, 29 West 39th St., New York City.

### National Municipal League.

Announcement has been made of the program of the National Municipal League for the Moot Constitutional Convention which will be a feature of the League's twenty-fifth annual meeting, to be held in Cleveland, December 29, 30 and 31. The purpose of the convention is to consider what form and provisions of a state constitution are best suited to present-day needs of state, county and municipal government, a question of immediate interest because of the general movement in many states for a revision of state constitutions that are regarded as outworn and inadequate. Illinois and Nebraska have recently elected delegates to constitutional revision conventions, Pennsylvania and Vermont have newly appointed commissions to consider the need of new constitutions, and other states are preparing to fall into line.

"Every once in a while the ordinary layman, who has approved of the passage of some desirable law or the institution of some much-needed political reform, is jolted by the news that it has been declared unconstitutional by the courts. It requires a concrete demonstration of this kind to bring home to the average citizen the fact that some constitutional provisions and restrictions imposed twenty-five or fifty years ago are badly out of touch with changed conditions; but students of political science have long realized that many desirable improvements in our laws are hampered or altogether prevented by antiquated constitutional requirements. Many sources of waste of public funds and many inequalities in political and social conditions are perpetuated by this means.

"The National Municipal League, for twenty-five years a leader in devising and testing improvements in government and administrative methods, has adopted the moot convention method of crystallizing the sentiment for constitutional improvement and of organizing the work of specialists in this direction. The plan has attracted nation-wide attention, and representatives of many organizations interested in problems of a civic or governmental nature, including the National Short Ballot Organization, the Proportional Representation League, the American Judicature Society, the Na-

tional Civil Service Reform League, the Honest Ballot Association, the Political Science Association, the National Voters' League, the National Budget Committee, the Institute of Government Research, the War Camp Community Service, and many governmental research bureaus, are arranging to be present to observe the proceedings of the National Municipal League's moot convention and participate in the discussions. It is also probable that many of the delegates to the constitutional conventions of Illinois and Nebraska will attend.

"The scope of a state constitution covers every field of state, county and municipal government, so that the moot constitutional convention of the National Municipal League will have a wide range of subjects to consider. These include not only such technical matters as budgets, civil service, debt limitations, and limitations on legislation, but also the whole gamut of vexing problems that involve the constantly rising cost of living; the triangular relation of capital, labor and the consumer; and the proper status and control of public utilities. Information has already come to the headquarters of the National Municipal League that many authorities in economic and political science, including Prof. Albert Bushnell Hart and Prof. A. N. Holcombe of Harvard University, Dr. Charles A. Beard of the New York Bureau of Municipal Research, and H. W. Dodds of the Western Reserve University, are preparing constitutional proposals to be offered at the moot convention."

### International Power Economy Conference.

A meeting of the Executive Committee of the International Power Economy Conference was held recently having been called by chairman C. A. Tupper for the purpose of formulating a plan of permanent organization.

It was the general opinion that the first work should embrace the formulation and printing of a statement of the objects sought, which should also give a tentative constitution, clearly point out the aims of the Conference, the general ideas of procedure to reach the goal aimed at and explain the organization necessary to accomplish the desired result.

A campaign should then be started to secure not less than 100 contributing members and more, if possible, to finance the greater work which must follow if success is to be achieved.

The executive secretary was directed to proceed immediately with this work as the situation with regard to fuel is already bad with absolutely no indications that conditions are likely to improve, at least in the near future. The

Conference now has the service of Col. F. G. Bolles, late of the War Department Claims Board, Washington, D. C., as executive secretary. Colonel Bolles is well qualified for this work. His past experience in the national field of power development with such concerns as Westinghouse Electric & Manufacturing Co., Bullock Electric Manufacturing Co., Allis-Chalmers Co. and the Bucyrus Co., gives him a firm grasp of the problem and its importance as a national conservation. His knowledge of foreign economic conditions was gained through six years' travel in fourteen European countries.

### The American Association of Engineers.

The American Association of Engineers announces that effective with the January number its official publication, *The Monad*, will be published under the name of "Professional Engineer." At the same time the change in name is made the publication will be increased to a 9 x 12 page. The magazine will remain a monthly.

Following a favorable vote on the part of the members of the Idaho Society of Engineers for a liaison with the American Association of Engineers the executive committee of the society has resolved to amalgamate with the American Association of Engineers under the title of the "Idaho Society of Engineers" Chapter of the American Association of Engineers."

### Electric Vehicle Section, National Electric Light Association.

A meeting of the executive committee of the Electric Vehicle Section of the National Electric Light Association was held recently at the New York headquarters. Chairman George B. Foster presided.

E. R. Whitney, who accepted appointment as chairman of the standardization committee, announced that the Society of Automotive Engineers had suggested the formation of an electric transportation division of its standards committee, of which E. P. Chalfant had been suggested as chairman. The division would be divided into the following sections: Electric commercial vehicles, electric passenger cars, electric industrial trucks and tractors, electric storage batteries and electric wheel chairs, with the possibility of an accessories section. The chairman of these sections, together with the chairman of the division, constituting the executive committee of the division, would report to the main standards committee of the Society of Automotive Engineers.

It was the consensus of opinion that much valuable work could be undertaken by the federal and municipal transportation committee this year, notably immediate co-operation with the New York-New Jersey Port and Harbor Development Commission, for

(Continued on page 336)



# NEW APPLIANCES

Describing New Machinery, Apparatus, Materials and Methods and Recent Interesting Installations.

## PORTABLE AIR COMPRESSOR.

### New Ingersoll-Rand Light Gasoline-Driven Equipment.

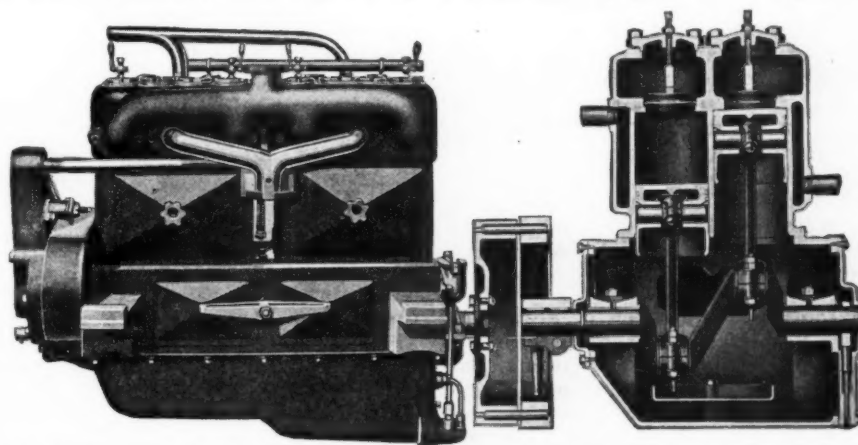
Portable air compressors have popularized all sorts of pneumatic labor saving devices for the contractor and eliminated the trouble and expense of installing an air power plant on his short-time job. "Portable" however, has sometimes been a misnomer, meaning merely "mounted on wheels." Portable outfits of many varieties have been developed in the past few years, each successive design bettering the one which preceded it and now Ingersoll-Rand Company has recently introduced a light weight gasoline engine driven unit, built in two sizes, to be known as the "Imperial Type 14 Portable Compressor."

These are all-steel outfits, from their sheet steel canopy to the broad tired steel wheels. The power plant of each consists of a duplex, vertical compressor driven at high speed by a four cylinder, four cycle, tractor type gasoline motor. The outfit, being designed especially for portable use, has had unnecessary weight eliminated, and is designed to afford maximum air power output per unit weight. The larger machines, of 210 cu. ft. capacity weighs only 6000 lbs. and the 118 cu. ft. unit 4000 lbs. The gasoline motor drive provides power in economical form and in a mechanism that can be confidently entrusted to the average operator, for men familiar with gasoline engines are everywhere available and make thoroughly competent engineers for the work in which they are used.

The compressors have cylinders cast en-bloc, with cylinder heads, valve chambers and water jackets integral. Both intake and discharge valves are of

plate type and are located directly over the cylinder bore. Crank shafts and connecting rods are drop forgings. Air pistons are fitted with three piece piston rings and, in addition, with an oil wiper ring. This latter returns all surplus oil from the cylinder walls to the crank case, and is claimed to obviate the difficulty caused by having

The gasoline driving motors are of long stroke type, and operate at medium speed. They are equipped with high tension magneto ignition with automatic governors to maintain constant speed under all working conditions and to prevent overspeeding when idling. A splash oiling system lubricates all moving parts. Starting crank



SECTIONAL POWER PLANT, INGERSOLL-RAND AIR COMPRESSOR (118 cu. ft. capacity)

the air carry an excess of oil into the receiver.

All bearings are die castings of anti-friction metal. Hand holes in the crank case permit convenient access for adjusting main bearings and those of the crank pins. All parts are lubricated by splash from an oil reservoir in the crank case.

The compressors are provided with inlet unloading devices which automatically close the compressor intake when the receiver pressure rises above a predetermined limit, and permit the machine to again take up its load when the pressure has fallen a definite amount.

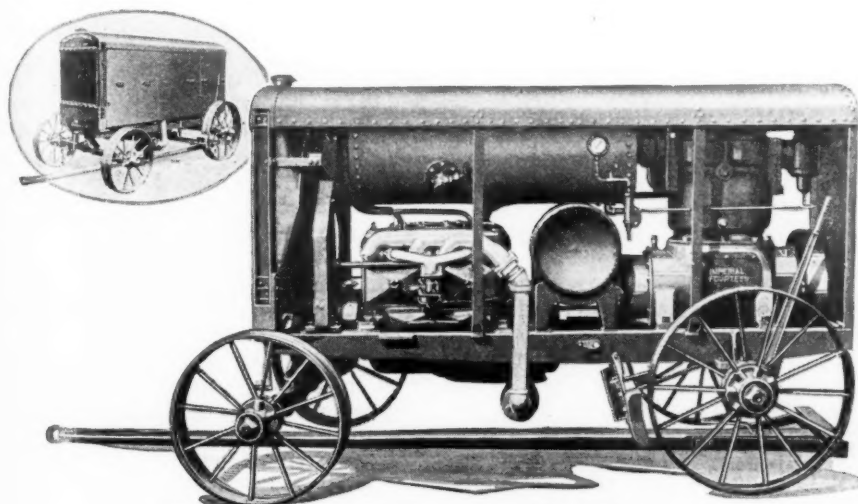
is located at the front of the machine beneath the radiator.

Both compressor and driving motor are water cooled by a circulating system, with centrifugal pump, large radiator and powerful blast fan. The radiators are made up of removable sections, a construction which allows the removal and repair of a damaged section without taking down the entire radiator or interrupting the use of the compressor.

Each of these units is equipped complete with receiver, safety valve, drain valves, pressure gauge and service valves to which the air hose lines may be attached. When fuel tank has been filled, lubricating oil provided and the cooling system supplied with water, the units are ready for work.

The mounting of the machine is of interest, particularly the swiveled front axle which moves freely in both horizontal and vertical planes. This, with the rigidly attached rear axle, gives three point suspension, and permits the outfit to pass over inequalities of the ground without any racking effect or misalignment of the power plant.

The two sizes 118 and 210 cu. ft. capacities, differ in respect to the location of the air receiver and in minor details of design. The power-compressor unit and the whole outfit are shown in the accompanying illustrations. These compressors are made by the Ingersoll-Rand Company.



IMPERIAL PORTABLE AIR COMPRESSOR (210 cu. ft.)

## INDUSTRIAL NEWS

### Asphalt Association Headquarters in Washington.

Washington has been selected as a district headquarters by **The Asphalt Association**, whose main office is in New York. At the nation's capital, as most of the large industries now realize, decisions of great moment are constantly being made by federal departments and bureaus. It is estimated that this year more than forty million square yards of asphalt will be laid in the United States.

Major Harry D. Williar, an engineer officer in the First Division overseas, will have charge of the Washington office of the Asphalt Association, in the Munsey Building. Major Williar is a Marylander, receiving his training as an engineer on the State Road Commission and later with the paving commission of Baltimore. Included in the Washington District are the states of Maryland, Pennsylvania, Delaware, Virginia and West Virginia.

### International Exposition of Municipal Equipment Discontinued.

The project for an International Exposition of Municipal Equipment which was to be opened recently at the Grand Central Palace, New York City, under the direction of the Merchants and Manufacturers Exchange, has been abandoned. It is expected that some of the prospective exhibitors will show their equipment in the machinery exhibition in which they will probably attract wider attention from more varied groups of visitors.

### Sinclair Refining Company to Produce Asphalts.

**The Sinclair Refining Company**, 111 West Washington st., Chicago, Ill., announces the formation of an asphalt sales department to handle the output of the Meraux, Louisiana, refinery, formerly owned and operated by the Freeport & Mexican Fuel Oil Corporation. The plant will be devoted exclusively to the production of refined asphalt from specially selected heavy maltha from the Panuco Field in Mexico.

It is the intention of the company to produce a complete line of high grade asphalts for all purposes. By reason of controlling, through its affiliated companies, its own producing properties in Mexico and ample steamship facilities to transport the raw material to the refinery at Meraux, the company is ideally situated to become an important factor in the asphalt business in this country.

A large number of tank cars specially equipped for handling asphalt is already in service, and the equipment is being steadily increased.

The headquarters of the new department will be located in the Conway Building, Chicago, and E. F. Fitzpatrick

has been appointed manager and J. M. Woodruff, assistant manager.

Mr. Fitzpatrick has had a wide experience in the general asphalt and petroleum business, both in this country and in the Republic of Mexico. He has been identified with the Sinclair Refining Company for the past year and a half, having joined the organization originally as manager of the refinery sales department and for the past several months has been assistant sales manager of the general oil section of the business.

Mr. Woodruff was formerly manager of the paving and publicity departments of the **Standard Asphalt and Refining Company**. He has been identified with the marketing and use of asphalt in pavement construction in the central and southern states for the past ten years. He assisted in organizing the Southern Asphalt Association of Atlanta, Georgia. He resigned as general manager of that association to accept the position with the Sinclair Refining Company.

### War Department to Sell Electric Generator Sets.

The Director of Sales announces that the Surplus Property Division, Office of the Quartermaster General of the Army, is offering for sale 400 gasoline driven, electric generator sets, with switchboards and gasoline tanks, which have been declared surplus by the War Department and on which offers will be received at any time by the Surplus Property Division, Munitions Building, Washington, D. C.

The generator is a 25 kilowatt, direct current commutation pole type. Either 115 volt, two wire, or 230 volt, three wire, generators can be supplied. The engine is of the closed, four cycle, single acting, vertical type, with four cylinders and is capable of operating the generator at full load indefinitely, and at a 25 per cent overload for two hours. The sets are high grade in every respect and combine a number of improved safety and gasoline saving features.

These machines are designed for close regulation which makes them very desirable for small electric light and power plants, such as are required by stores, apartment houses, hotels, small factories and even small towns. Owing to the present coal shortage and the curtailment of electric current in many cities and towns throughout the country, these gasoline driven generators should prove particularly useful as auxiliary or emergency lighting and power equipments.

The sets which the government is offering for sale, are new and have been carefully stored since they were purchased by the government about a year ago. They are packed in the crates in which they were shipped from the factory. They are located at Schenectady, N. Y., and New Cumberland, Pa., and will be shipped promptly upon approval of submitted offers.

Inspection of the machines, switch-

boards and tanks may be made at the points of storage or complete specifications may be obtained from the Surplus Property Division, Munitions Building, Washington, D. C. Information relative to the terms of sale, storage points, etc., may be obtained from the same office.

### "Malleable Castings" Manufacturers Organize to Improve Product.

Considerable interest is being directed at the **American Malleable Castings Association**, which represents the many district organizations in the malleable castings industry. Under great difficulties the members are determined to establish a standard of quality. This unusual action by a group of competitors, the strong assisting the weak, has for its object the improvement of the quality of the industries products and results now announced prove the success of their endeavors.

Aside from the various laboratories of its members the association maintained at Albany a Research Department for investigation and experiment, and for the testing and analysis of the daily output of each member of the association. Impartial tests were made and the results, together with direction for improvement, where the need was indicated, were forwarded to the respective members.

So successful has the work of the association proved that today it is credited with bringing all its members to a high average quality in their product, known as "malleable castings." Having accomplished that result, the association it is said will continue these daily tests and analyses for the purpose of grading the product of each member. When a member's product has daily met the requirements of the prescribed standard for a period of three months a "certificate of quality" will be issued to that member, who may designate his output as "Certified" malleable castings. These certificates will be renewed quarterly where the quality required is maintained.

The association is issuing a booklet on Malleable Iron and its production which should prove very interesting to those who desire a better understanding of the methods employed in the improvement of that product. The book can be obtained without charge by writing to the American Malleable Castings Association, 1900 Euclid Building, Cleveland, O.

## NEWS OF THE SOCIETIES

(Continued from page 334)

which B. F. Cresson is consulting engineer.

F. M. Feiker, chairman transportation engineering committee, stated that the committee had developed a national list of users of electric trucks, which, though not complete, at least included the most representative users. Questionnaires are being sent in an effort to ascertain operating cost data, etc.



# ADVANCE CONTRACT NEWS

## ADVANCE INFORMATION BIDS ASKED FOR

To be of value this matter must be printed in the number immediately following its receipt, which makes it impossible for us to verify it all. Our sources of information are believed to be reliable, but we cannot guarantee the correctness of all items. Parties in charge of proposed work are requested to send us information concerning it as early as possible; also correction of any errors discovered.

## BIDS ASKED FOR

### STREETS AND ROADS.

**Fla., Lake City.** Jan. 6  
Hard-surfaced roads in Columbia Co.  
—Bd. Co. Comrs.

**Ga., Adel.** noon, Jan. 7  
14.79 mi. paved road in Cook Co., involving 2.05 acres clearing and grubbing; 12,024.5 cu. yd. common earth excav.; 20,945.5 cu. yd. borrow earth excav.; 747.09 cu. yd. concr.; 17,092 lb. rein. steel, 35 lin. ft. 15-in., 632.5 lin. ft. 24-in. and 42.5 lin. ft. 30-in. D. S. vitr. clay pipe, and 86,787.78 sq. yd. paving with vitr. brick, asphaltic concr., Topeka mix, bituminous macadam, bituminous macadam Finley method, rein. concr. or plain concr.—H. S. Jaudon Engrs. Co., Elberton, Proj. Engrs.

**Ind., Woodbine.** 8 p.m., Dec. 29  
Paving as follows: 9,000 cu. yd. grading excav.; 1,107 ft. 6x12-in. curb; 17,097 ft. 6x12-in. curb with 18-in. gutter; 3,819 ft. 6x14-in. curb with 18-in. gutter; 4,323 ft. 24-in. gutter; 50,000 sq. yd. street paving; 1,500 sq. yd. alley pavement.—Huff & Schmidt, Civ. Engr., Logan.

**Ind., Ft. Wayne.** Jan. 8  
33,245 ft. stone road in Marion Twp.; 5,255 ft. stone road in Madison Twp.; 21,290 ft. stone road in Lafayette Twp.; 13,266 ft. stone road in Jackson Twp.; 10,616 ft. stone road in Bel River Twp.; and 14,300 ft. stone road in Cedar Creek Twp.—A. C. McCoy, Allen Co. Comr.

**Ind., Ft. Wayne.** Jan. 9  
7,380 ft. stone road in Maumee Twp.; 15,828 ft. stone road in Monroe Twp.; and road in Springfield Twp., all in Allen Co.—A. C. McCoy, Co. Aud.

**Ind., Kentland.** 2 p.m., Jan. 5  
Macadam rd n Newton Co.—S. R. Sizelove, Co. Aud.

**Ind., Rockville.** noon, Jan. 6  
6,290 ft. gravel road in Penn twp., Parke Co.—R. E. Porter, Co. Aud.

**Ind., Martinsville.** 1 p.m. Jan. 6  
2,870 ft. macadam road in Jackson Twp.—H. H. Nutter, Co. Aud.

**Mich., Lansing.** 1.30 p.m., Jan. 5  
5.984 mi. trunk line, 16-ft., class B gravel road in Ionia Co.—F. F. Rogers, State Hwy. Comr.

**Minn., Duluth.** Jan. 15  
Grading, surfacing and paving 6,990 ft. 45-ft. roadway with asphalt on 6-in. concr. base, including 13,980 lin. ft. concr. curbing.—E. K. Coe, City Engr.

**Mo., St. Louis.** Jan. 15  
Paving 1 blk. in Whittier st. and 5 blks. Morganford rd., 24 ft. wide, vitr. brick, to cost \$14,550 and \$75,050, respectively.—C. E. Smith, City Engr.

**Mo., St. Louis.** Jan. 17  
Paving street with brick and street with asphalt, both 24 ft. wide.—C. E. Smith, City Engr.

**Mo., St. Louis.** Jan. 28  
Paving 9 blks. city street, 24 ft. wide, with asphalt, granite curbing, to cost \$126,000.—C. E. Smith, City Engr.

**Mo., St. Louis.** Jan. 5  
Paving two streets with brick, one street with wood blk. and one street with asphalt, all 30 ft. wide.—C. E. Smith, City Engr.

**N. J., Trenton.** Jan. 7  
9,072 sq. yd. state hwy. in Middlesex Co. concr. surface.—A. L. Grover, Chf. Clk., State Hwy. Comn.

**N. J., Lawrenceville.** Dec. 27  
Improving street involving 3,257 sq. yd. water bound macadam.—F. W. Kafer, Clerk.

**N. Y., New York.** 2.30 p.m., Dec. 30  
Repaving with sheet asphalt on concr. foundation roadway of Bronx and Pelham Parkway.—F. D. Gallatin, Pres., Dept. of Parks.

**N. Y., New York.** 10.30 a.m., Dec. 30  
Furnishing sand and gravel for Dept. of Parks, Manhattan and Richmond.—Bd. Purch., Municipal Bldg.

**N. Y., New York.** 2.30 p.m., Dec. 24  
Improving driveway in Prospect Park, involving regulating and grading, sheet asphalt paving on concr. foundation and laying brick gutters, etc.—F. D. Gallatin, Pres., Park Bd., Dept. Parks.

**N. C., Raleigh.** noon, Jan. 3  
2.08 mi. state hwy. in Stanley Co., involving 2.21 acres clearing and grubbing; 15,900 cu. yd. earth excav.; 6,128 cu. yd. top soil surfacing; 156 lin. ft. 15-in., 124 ft. 18-in. and 108 ft. 24-in. terra cotta pipe in place; 6,027 lb. rein. steel, etc.—W. S. Fallis, state hwy. Engr.

**N. C., Raleigh.** noon, Jan. 3  
8.66 mi. state hwy. in Union Co., consisting of 763 cu. yd. solid rock excav.; 437.8 cu. yd. borrow; 29,189.3 cu. yd. earth excav.; 8.6 acres clearing and grubbing; 20,329.3 cu. yd. soil surfacing; 884 lin. ft. 15-in., 427 lin. ft. 18-in., and 347 lin. ft. 24-in. terra cotta pipe in place; 114.84 cu. yd. class B concr. for head walls; 134.48 cu. yd. class A concr. and 9,782 lb. rein. steel for concr. culverts; 198.02 concr., 9,724 lb. rein. steel and 343 lb. plates and bolts for concr. bridges.—W. S. Fallis, State Hwy. Engr.

**R. I., Providence.** noon, Dec. 24  
2 sections state hwy. in town of Lincoln, 1,975 ft. and 8,180 ft. in length.—State Bd. Pub. Roads, State House.

**Tex., Athens.** Dec. 29  
Grading, surfacing and draining 11.66 mi. 16-ft. road, involving 11.1 acres clearing and grubbing; 15,915 cu. yd. gravel; 64,343 cu. yd. earth excav., and 849 cu. yd. concr.—Wildner & O'Neil, Engr., Mt. Pleasant.

**Tex., Athens.** Dec. 29  
Highway in Henderson Co.—Wildner & O'Neil, Mt. Pleasant, Engrs.

**Tex., Denton.** Dec. 30  
Highway in Denton Co. to cost \$164,896.71.—Bryant & Huffman, Littlefield Bldg., Austin, Engrs.

**Tex., Denton.** 3 p.m., Dec. 30  
10,034 mi. hwy. in Denton Co., including 75,000 cu. yd. earth excav.; 17 acres clearing and grubbing; 2,800 cu. yd. rock excav.; 490 cu. yd. class A and 370 cu. yd. class B concr.; 68,000 lb. rein. steel; 21,000 cu. yd. gravel (base)—Bryant & Huffman, 213 Littlefield Bldg., Austin, Engrs.

**Tex., Waco.** 10 a.m., Jan. 2  
1.01 mi. rein. concr. road in McLennan Co.—M. Hannah, Co. Engr.

**Tex., Snyder.** 1 p.m., Jan. 12  
State hwy. in Scurry Co., consisting of grading, surfacing with local gravel 16 ft. wide and 10.5 mi. long, constructing ditches and concr. drainage structures, etc., total length, 21.5 mi.—H. Exall Elrod Co., Engrs., Dallas.

**Va., Franklin.** 10 a.m., Dec. 29  
Grading and draining in Pendleton Co.—E. E. Smith, Engr., Keyser.

**Wash., Olympia.** 2 p.m., Jan. 5  
Grading and draining 8.6 mi. Inland Empire hwy. between Delaney and Dodge in Columbia and Garfield Cos.; grading and draining 28 mi. Central Washington hwy., between Connell and Lind, in Adams and Franklin Cos.—J. Allen, State Hwy. Comr.

## CONTRACTS AWARDED ITEMIZED PRICES

**Wash., Olympia.** Jan. 5  
Grading 29 mi. hwy. in Franklin and Adams Cos.; completing gap in Inland Empire hwy. 9 mi. in length between Dayton and Colfax.—State Hwy. Comr.

**W. Va., Charleston.** 11 a.m., Jan. 14  
2.6 mi. road, consisting grading, drainage structures and 1-course plain cement concr. paving, with necessary work.—Co. Engr.

**W. Va., Hamlin.** Jan. 6  
Improving 6,000 ft. road from Hamlin to West Hamlin, involving 40,000 cu. yd. excav. and 10,000 sq. yd. concr.—G. J. Barturg, Engr., Hamlin.

**Wis., Wauwatosa.** Dec. 26  
Improving street, involving 15,000 to 25,000 cu. yd. earth grading.—J. E. Lowther, City Engr.

## SEWERAGE.

**Ind., Kokomo.** Feb. 2  
16,100 lin. ft. 15-84-in. sewer pipe and laterals.—Bd. Pub. Wks.

**Ind., Woodbine.** 8 p.m., Dec. 29  
Storm sewer system—Huff & Schmidt, Civ. Engrs., Logan.

**Mich., Grosse Pointe.** Dec. 31  
Storm sewer system and sewer outlet to discharge into lake, involving 1,100 ft. 36-in. rein. concr. or segmental blk. and 2,490 ft. 15 to 24-in. vitr. crock pipe.—M. L. Brown & Sons, Engrs., 823 Chamber of Commerce, Detroit.

**Minn., Little Falls.** Jan. 14  
Sewers, involving 350 ft. 10-in., 1,313 ft. 12-in., 779 ft. 18-in., 810 ft. 20-in. sewer, 1 manhole 8 ft. deep, 1 manhole 10 ft. deep, 2 manholes 12 ft. deep and 2 manholes 13 ft. deep.—C. L. Pillsbury Co., Engrs., 805 Metropolitan Life Bldg., Minneapolis.

**Minn., Duluth.** Jan. 15  
2,330 ft. rein. concr. sanitary sewer.—L. Ayers, City Engr.

**N. Y., New York.** 10.30 a.m., Dec. 30  
Sewer and appurtenances in 2 streets, involving 191 ft. 18-in., 332 ft. 15-in. and 881 ft. 12-in. vitr. pipe sewer and 50 lin. ft. 12 to 24-in. vitr. pipe drains, 198 spurs for house connections, 15 manholes, etc.; also storm water drain and appurtenances with temporary connection with sanitary sewer in Bronx Park, involving 764 lin. ft. vitr. pipe drain, 12 to 24-in., 60 spurs, 8 manholes, 3 receiving basins type B, 4 inlets type C, etc.—H. Bruckner, Pres., Boro. of Bronx.

**O., Cheviot.** noon, Dec. 27  
Sewers in 2 vil. streets.—J. Schmitt, Vil. Clk.

**O., Cincinnati.** noon, Dec. 30  
Sewering 960 ft. sidewalk.—Chf. Engr., Dept. Pub. Serv.

**O., Toledo.** noon, Dec. 30  
Contract No. 1 of Ten Mile Creek intercepting sewer, consisting of 17,080 ft. 72-in. circular sewer, 1,400 ft. 66-in. circular sewer and manholes and appurtenances.—D. H. Goodwillie, Dir. Public Service.

## WATER SUPPLY.

**Ill., Galesburg.** 5 p.m., Jan. 5  
Complete pumping unit.—F. M. Connolly, City Engr.

**O., Cincinnati.** noon, Dec. 30  
Constructing steam piping, fittings and valves for river pumping station in California, O.—Gen. Supt. Water Works, city hall, Cincinnati.

## BIDS ASKED FOR

## BRIDGES.

**Cal., Whittier.** Jan. 5  
Furnishing and installing 2,400 tons 4 to 24-in. class B and C cast iron water pipe fittings and equipment for pumping water and generating 200 kw. electric current.—C. L. Trueblood, City Clk.

**Wis., Rio.** 8.30 p.m., Jan. 5  
Furnishing and laying 8,289 ft. 6-in., 1,267 ft. 8-in. cast iron pipe, 18 hydrants, three 8-in. and eight 6-in. valves; one 15 HP. engine, one 150-gal. deep well pump; one 10-in. well, 200-ft. to 300-ft. deep; one elevated tank 40,000 gal. on 80-ft. tower; one brick, cement blk., concr. or tile power house, 12-ft. by 18-ft.—W. C. Kirchoffer, 31 Vroman Bldg., Madison, Engr.

**Ont., Toronto.** noon, Jan. 17  
5,000 lengths 6-in., 1,000 lengths 12-in. and 1,000 lengths 16-in. cast iron pipes, 500 tons 6-in., 12-in. and 16-in. cast iron specials; 200 6-in., 30 12-in. and 20 16-in. gate valves; 250 hydrants and 250 round cast iron valve covers and frames.—F. Barber, York Twp., Engr., 40 Jarvis St.

## LIGHTING AND POWER.

**Ky., Richmond Station.** 2 p.m., Dec. 27  
Power house at dam in Ohio River.—U. S. Engr., Cincinnati.

**O., Toledo.** noon, Dec. 30  
Furnishing one crank and flywheel type, cross compound air compressor, with 250 cu. ft. per min. capacity, to operate with 160 lbs. initial steam pressure, exhausting against atmospheric pressure; air end to be 2-stage, with intercooler between 2 cylinders, proportioned for maximum air discharge of 100 lbs. per sq. in.—D. H. Goodwillie, Dir. Pub. Serv.

**Wash., Seattle.** 10 a.m., Dec. 26  
Steel, completely fabricated, for 78-in. pipe line.—C. B. Bagley, Secy., Bd. Public Wks.

## FIRE EQUIPMENT.

**N. Y., New York.** 10.30 a.m., Dec. 30  
Furnishing 2 motor-driven 75-ft. hook and ladder trucks and 2 motor-driven 65-ft. hook and ladder trucks.—T. J. Drennan, Fire Comr., Municipal Bldg.

**Wash., Olympia.** 5 p.m., Jan. 6  
Furnishing 1,000 ft. 2½-in. fire hose, double jacket, three-ply rubber-lined, with Pacific Coast standard coupling.—H. Dohm, City Clk.

## ROADS AND STREETS

**Ala., Birmingham.**—City will spend \$12,500 for street improvement.

**Ala., Decatur.**—City Council passed resolution to pave nine streets. Cost, \$300,000.

**Ala., Albany.**—City Clerk Hartung and City Attorney Tidwell named as committee to advertise for bids for \$375,000 of street improvement bonds, authorized by ordinances recently passed. Bids will be received Jan. 6.

**Ark., Ozark.**—It is planned to pave number of streets in business section. Address City Clerk.

**Ariz., Yuma.**—Yuma county voted \$1,200,000 bonds to grade and pave roads. Federal Government will appropriate \$150,000 toward project.

**Cal., Chico.**—Plan submitted to ballot calls for construction of 196 miles of thoroughfares and estimated costs as follows: Larkin Rd., 34 mi., \$32,000, asphalt macadam; Gridley Lane, 5 mi., \$50,000, concrete or asphalt or asphalt concrete; Gridley Colony Rd., 3 mi., \$25,000, asphalt concrete; Gridley-Colusa Rd., 10 mi., \$140,000, heavy concrete, good foundation or asphalt concrete; East Biggs Rd., 3 mi., \$25,000, asphalt concrete; West Biggs Rd. to Butte Creek, 9 mi., concrete; Biggs-Ricton Rd., 3 mi., \$36,000, asphalt concrete or concrete; Nelson-Blaves to Butte Creek, 5½ mi., concrete and as-

**D. C., Washington.** 10.30 a.m., Dec. 29  
Stay-bolt iron, steel, brass, bronze, copper, lead, solder, bolts, rivets, washers, sulphuric acid, calcium chloride, chloride of lime, dry red lead, etc.—A. L. Flint, Gen. Purch. Agt., Panama Canal.

**Fla., Milton.** 10 a.m., Jan. 5  
Bridge over Blackwater River, consisting of 4 steel girder approach spans and a steel bascule lift span, 338 ft. long of four 60-ft. deck girder spans, and a Strauss bascule lift span with 80-ft. clear channel, 18-ft. roadway and one 6-ft. sidewalk, all on substructure of concr. piers, involving 8,250 lin. ft. foundation piling, 1,348 cu. yd. concr., 220,000 lbs. structural steel for approach spans, 200,000 lbs. steel for bascule span, 22,500 lbs. castings, machinery, etc., 716 lin. ft. hand rail, etc.—C. A. Browne, State Hwy. Engr., Tallahassee.

**Ida., Idaho City.** 1.30 p.m., Jan. 12  
Bridge across Payette River near Gardena.—F. Garrecht, Clk., Boise Co.

**Mich., Lansing.** 1.30 p.m., Dec. 24  
Constructing two 24-ft. rein. concr. abutments and two 9-ft. piers, containing 221 cu. yd. concr. for each; also 60-ft. deck plate girder on steel bents and two 40-ft. I-beam approach spans with 18-ft. roadway for each of above bridges. F. F. Rogers State Hwy. comr.

**Mont., Belton.** 2 p.m., Jan. 20  
Steel or rein. concr. bridge across middle fork of Flathead River, near here.—A. T. Vogelsang, 1st Ass'n Secy.

**N. S., Halifax.** noon, Jan. 5  
Annapolis and Allen Creek bridges.—Provincial Hwys. Bd.

**Okla., Minco.** 3 p.m., Dec. 30  
Bridge across South Canadian River, rein. concrete, seven 14x160-ft. arches, 20-ft. roadway, 6 piers, 2 abutments, total length 1,242 ft., involving 4,700 cu. yd. sand excav.; 263 cu. yd. shale excav.; 4,057 cu. yd. class A, 928 cu. yd. class B, and 3,446 class C concr.; 510,906 lbs. rein. steel, 2,724 lin. ft. railing.—M. L. Cunningham, State Engr., State Capitol.

**Pa., Bethlehem.** Feb. 7.  
Rein. concr. and steel bridge, 1 mi. long, 64 ft. wide, to cost \$2,315,000.—C. Hudson, 21 Park Row, N. Y. C., Engr.

**Pa., Reading.** Dec. 29  
Bridge over Schuylkill River in Berks Co.—C. E. Sanders, Engr.

**Wash., Seattle.** Jan. 6.  
Raging River bridge near Falls City

and Lee Hill bridge across White River, near Auburn.—Bd. King. Co. Comrs.  
**B. C., Vancouver.** Dec. 29  
Dredging and filling work for new piers to be constructed in Burrard Inlet.—C. P. R.

## MISCELLANEOUS.

**Minn., Minneapolis.** 11 a.m., Jan. 12  
Furnishing one portable gravel screening and loading plant.—A. P. Erickson, Co., Aud., Court House.

**N. Y., New York.** noon, Dec. 29  
New freight shed and pier reconstruction and installing water supply and plumbing at foot of 18th and 25th Sts., East River, Borough of Manhattan.—M. Hulbert, Comr. Docks.

**N. Y., New York.** noon, Dec. 30  
Disposal of ashes, street sweepings and rubbish in Borough of Brooklyn from April 1, 1920, to Mar. 31, 1923, or to Mar. 31, 1925.—A. B. McStay, Comr. Street Cleaning, Municipal Bldg.

**N. Y., New York.** 2 p.m., Dec. 29  
Receiving and removing ashes by scows during first half of year 1920.—G. A. Whalen, Comr. Plant and Structures, Municipal Bldg.

**N. Y., New York.** 10.30 a.m., Dec. 24  
Furnishing 21 gasoline-propelled and pumping engines.—T. J. Drennan, Fire Comr., Municipal Bldg.

**O., Canton.** noon, Dec. 29  
Furnishing one ¾-ton truck.—City Engr.

**Pa., Philadelphia.** 11 a.m., Dec. 29  
Furnishing bricks, cement, gravel, terra cotta pipe, sprinkling wagons, broken trap rock and screening, broken slag, naphtha lights, etc.; also following work: Paving, cut granite curbing, vitr. and slag blocks, cleaning wells, fencing granolithic and asphalt pavements for the year 1920 for parks under control of comrs. Fairmont Park.—A. Corson, Chf. Engr.

**P. R., San Juan.** 2 p.m., Feb. 2  
Constructing tower and dwelling for Point Jiguero light station at Rincon.—Supt. Lighthouse, San Juan.

**B. C., Westminster.** Jan. 7  
Building dam, embankment and three groynes at Nicomen Island, Fraser River.—Dept. Pub. Wks., Ottawa.

**Wash., Seattle.** 10 a.m., Jan. 5  
Constructing wharf in King Co.—N. M. Wardall, Clk., Bd. Co. Comrs.

**Cal., San Francisco.**—It is proposed to pave Market St. extension over Twin Peaks tunnel; cost \$32,000; also to improve and widen San Jose Ave. at total cost of \$90,000.

**Colo., Boulder.**—Federal aid for construction of eight-tenths of mile near Boulder, cost \$44,800, is asked in plans submitted recently by State Hwy. Comm. to Denver district office of U. S. Bureau of Roads. Total asked by commission from government is \$278,200. Federal aid is also asked for construction of 1 2-10ths mi. southward from Longmont, \$44,800. Other road aid asked for is 2.75 mi. road over Battle Mountain, between Red Cliff and Minturn, cost \$114,000.

**Del., Dover.**—Contracts let early in 1920 for construction and improvement of roads in Delaware. Charles M. Upham, Chief Engr. of Delaware State Highway Commission.

**Fla., Marianna.**—Election held Dec. 21 upon issuance of municipal bonds for paving streets. The Mayor.

**Fla., Panama City.**—City voted \$132,000 bonds for paving and draining various streets. F. S. Parrigin, Lexington, Ky. Engr.

**Fla., Mayo.**—\$10,000 road construction bonds by two districts in Lafayette Co. was voted. Chairman Bd. of Co. Comrs.

**Fla., Ocala.**—Issuance of \$1,500,000 bonds by Marion Co. for constructing roads was voted. Chairman, Bd. County Comrs.

**Ga., Savannah.**—Chatham County will build bridges, culverts, road grading and paving, amounting to \$400,000.

phalt concrete; Butte City Rd., 14 mi., \$140,000, concrete or asphalt concrete; Dayton to Durham Rd., 4 mi., \$32,000, asphalt macadam or asphalt concrete; Sacramento Ave., 3 mi., \$25,000, asphalt macadam; Nord State Hwy. Rd., 4 mi., \$32,000, asphalt concrete; Cana-State Hwy. Rd., 3 mi., \$25,000, asphalt concrete; Cohasset-Richardson Springs Rd., 7 mi., \$56,000, asphalt macadam and asphalt concrete; Humboldt Rd., 16 mi., \$80,000, crushed rock with asphalt surface; Neal Rd., 8 mi., \$80,000, asphalt concrete; Paradise or Stirling Rd., 15 mi., \$75,000, crushed rock; Oroville to Chico Rd., 12½ mi., \$100,000, asphalt concrete; Durham Rd., 4 mi., \$25,000, asphalt concrete; Oroville-Pentz Rd., 12 mi., \$96,000, light type asphalt concrete; Thermalito-Grand Ave., 4 mi., \$32,000, asphalt concrete; Oroville-Miners' Ranch Rd., 6 mi., \$30,000, asphalt macadam; Oroville to Bangor, 12 mi., \$78,000, asphalt concrete and asphalt macadam; Marysville and Oroville Rd., 16 mi., \$192,000, concrete; Palermo to Honcut, 9 mi., \$72,000, asphalt concrete.

**Cal., Napa.**—Municipal election for raising funds to pave state hwy. across city is proposed.

**Cal., Riverside.**—Bd. Supvrs. Riverside Co. having plans prepared paving 13 mi. road from Thermal to Mecca, concrete, 16 ft. wide. About \$250,000. A. C. Fulmer, Co. Engr.

**Cal., Imperial.**—City voted \$35,000 bonds to resurface Main St. and Imperial Ave., \$25,000 to pave approaches to Main St. and \$20,000 for approaches to Imperial Ave.

**Cal., Oroville.**—It is planned to extend Marysville Rd. 2 miles south. Address surveyor, Butte county.



**Idaho, Moscow**—Potlach Highway Dist., Latah county, voted \$350,000 bonds to build and hard surface roads.

**Ind., Indianapolis**—State Hwy. Dept. plans 300 mi. state hwy. next year. L. H. Wright, director.

**Ind., Noblesville**—State Board of Tax Comrs. approved bond issue of \$111,500 for Rooker road in Hamilton Co.

**La., Le Mars**—Mayor and City Council outlines plan for 1920 paving of 72 blocks.

**La., Hampton**—It has been decided to pave large number of streets. Improvements will comprise 50 blocks in different parts of city. Council is anxious to make contracts as soon as possible.

**La., Mason City**—Recent election resulted in favor of issuing road bonds of \$750,000.

**La., Sioux City**—South Sioux City will pave 3 mi. of streets next spring. Contract will be let by Council at early meeting. Paul Wells, City Clerk.

**La., New Orleans**—City will sell Dec. 29, 1919, \$1,600,000 of paving certificates. A. G. Ricks, Comr. Pub. Finances.

**La., Monroe**—\$498,000 bonds for paving have been voted. Construction will start after pipes are laid. W. W. Kirkpatrick, Engr.

**La., Eunice**, will shortly vote on \$150,000 additional street improvement bonds.

**La., Jena**—Issue of road bonds of \$500,000 has been purchased by National City county, of New York.

**Me., Augusta**—\$4,000,000 for rd. con. will be available in state next year. It is expected that 150 mi. new state hwy. will be constructed.

**Mich., Charlotte**—State Highway Dept. will start building unimproved trunk lines within Eaton Co. Hayes E. Wells, Co. Clerk.

**Miss., Rolling Fork**—Election upon \$65,000 rd. constr. bonds by Sharkey Co. is contemplated. Chn., bd. co. comrs.

**Miss., Vicksburg**—City is considering bond issue of \$100,000 for paving.

**Mo., St. Louis**—It is proposed to construct Manchester, St. Charles, Gravois and Lemay Ferry roads for St. Louis Co. County to pay \$983,353 and State with federal aid \$889,080. William Elbring, St. Louis, Co. Engr.

**Neb., Cozard**—City soon lets contract for 30,000 yd. 3-in. vitr. brick pavement on concrete base; \$140,000. J. R. Morearty, Grand Island, Engr.

**N. J., Camden**—City and co. rd. officials considering plans for extending new concr. hwy. between Burlington and New Jersey Masonic Home, on Jacksonville pike through that city.

**N. J., Elizabeth**—Bd. of Public Works passes ordinances for grading of several streets.

**N. Y., Elmira**—County Bd. Supvrs. took steps towards improvement of 5 hwy., as follows: Town of Baldwin, East Elmira to Breesport, distance 2½ mi. From a point in town of Van Etten, 2 mi. towards Van Etten. Road at boundary line of Elmira, 2 mi. Beginning at Tompkins Corners in Catlin, 2 mi. Beginning at north line of Elmira, running northerly along Lake St.

**N. Y., La Salle**—Election planned on \$60,000 road bonds. Address Town Clerk.

**N. C., Durham**—\$1,000,000 bond issue for roads in Durham co. contemplated. Address co. clk.

**N. C., Winston-Salem**—City Council passes ordinances authorizing bond issues totaling \$291,000 for improvement of streets.

**N. C., Dobson**—Surry Co. plans to gravel 7 mi. road. W. S. Fallis, care State Highway Comm., Raleigh, Engr.

**N. C., Statesville**—City will receive bids until Dec. 30 on bonds of \$100,000 for street improvement.

**N. C., Salisbury**—Rowan Co. plans to hard surface 3 mi. and sand clay 7½ mi. roads. W. S. Fallis, care State Highway Comm., Raleigh, Engr.

**O., Canton**—Stark County's road program for 1920 calls for improvement of 33 mi., involving 18 different roads, Co. Comrs. announced. Estimate, \$30,000 per mile.

**O., Toledo**—City Council considers ordinance to issue bonds of \$250,000 for repairing streets.

**O., Paulding**—Paulding Co. will receive bids until Jan. 2 on \$26,000 pike bonds. C. A. Woods, County Auditor.

**O., Sandusky**—1920 highway improvement program calls for expenditure of \$1,000,000. It is planned to improve 3 highways and mileage of improvements contemplated will total more than ten miles. They are: Milan-Elyria Rd., 6.5 mi.; Lima-Sandusky Rd., 2.6 mi.; Vermillion-Savannah Rd., 2.8 mi.

**O., Wauseon**—Fulton Co. Comrs. will receive until Jan. 3 on bonds of \$111,150 for construction of two roads.

**O., Bryan**—Surveys and plans for improvement of Williams Center Montpelier road have been completed and Bd. of Comrs. expect to improve road next year.

**O., Canton**—List of 25 streets to be paved during 1920, together with streets to be otherwise improved was submitted to City Council.

**O., Lima**—H. D. Miller is preparing plans for paving number of streets, to cost \$200,000. Bids to be advertised by A. L. Macheny, serv. dir.

**O., Findlay**—Co. Comrs. have decided to improve Findlay Carey Rd. at cost of \$70,000.

**Ore., La Grande**—Union Co. will sell Dec. 22 highway construction bonds of \$400,000.

**Ore., Klamath Falls**—Municipal bonds for street improvements of \$97,031.22 were awarded Lumbermen's Trust Co. of Portland by City Council.

**Ore., Portland**—Alaskan forest road program for 1920 calls for expenditure of \$200,000, according to estimates of Forest Service officials.

**Ore., Portland**—Comr. Barbur announced plans for following improvements are completed: Hard surfacing roads at \$214,647; laying sidewalks at \$11,365, and macadam at \$5,037.

**Ore., Grant Pass**—Preliminary investigation of Caves road indicates selection of route up Greyback creek for 1½ mi., crossing Lake creek to Cave creek.

**Ore., Salem**—Construction of Columbia River highway is going on all the way from Hood River to Pendleton, with exception of stretch of 14 miles from The Dalles to Deschutes River. This stretch has been delayed by controversy. Highway commission contended for river route and this has been agreed to by County Court, which practically effects settlement.

**Pa., Hazleton**—City voted \$500,000 bonds to grade, pave and lay sewers in various streets. J. Rough, City Engr.

**Pa., Johnstown**—Comrs. propose bond issue of \$500,000 to carry out road program next year. H. Frank, Dorr, Co. Hwy Engr.

**Pa., Harrisburg**—These counties have authorized bond issues: York, \$2,500,000; Mercer, \$1,500,000; Erie, \$1,300,000; Bradford, \$1,000,000; Indiana, \$100,000; Venango, \$1,000,000; Lawrence, \$1,000,000; Washington, \$1,000,000; Armstrong, \$1,000,000; Warren, \$750,000; McKean, \$750,000; Jefferson, \$500,000; Clarion, \$500,000; Lycoming, \$500,000, and townships of Jefferson County, \$400,000. Those counties whose commissioners have authorized loans are: Allegheny, \$3,000,000; Butler, \$1,500,000; Westmoreland, \$1,500,000; Fayette, \$1,000,000; Beaver, \$975,000; Greene, \$450,000; Schuylkill, \$300,000; Crawford, \$20,000, and Venango, \$100,000.

**Pa., Bethlehem**—Dec. 29 Mayor will sell bonds of \$155,000 for street paving.

**Pa., Ebensburg**—Cambria Co. will receive bids until Jan. 5 for \$500,000 bonds for roads.

**Tenn., Bristol**—Following announcement of proposed construction work on Mountain City to Bristol road was given out: "Sealed proposals for constructing or improving National Forest road project, located within White Top National Forest, counties of Sullivan and Johnson, will be received by District Engineer of Public Roads, U. S. Dept. of Agriculture, at Bristol, Tenn., within near future. Length of project to be constructed or improved is 12.23 miles, and principal items of work are as follows: 30 acres medium clearing and grubbing, 8,000 cu. yds. solid rock excav., 70,000 cu. yds. loose rock and earth excav. combined, 20,000 cu. yds. earth excav., 500 cu. yds. concrete, 228 cu. yds. cement rubber masonry, 1,000 lin. ft. corrugated metal pipe culverts, or 2x2 ft. log box culverts or 2x2 ft. concrete box culverts, 32,000 ft. board measure of bridge material, 2,600 cu. yds. stone or macadam.

**Tex., McKinney**—Plans being made for highway from Grayson county to Dallas county, cost \$497,050. J. B. Cockett, engr.

**Tex., Gatesville**—Comrs. Court ordered election Jan. 10, 1920, for purpose of voting \$1,000,000 issue of good roads bonds.

**Wash., Aberdeen**—\$1,200,000 road bond issue in Grays Harbor Co. carried.

**Wash., Ferndale**—Council is taking initial steps toward construction of needed sidewalks in spring.

**Wash., Kelso**—Cowlitz county comrs. call election some time in February to vote on proposition of issuing bonds for construction of roads in county. Issue will be for \$700,000 or more.

**Wash., Pullman**—Special city election to vote on question of bonding city for 15,000 for road construction will be called by city council in near future.

**Wash., Ritzville**—Adams Co. will undertake construction of more than 92 mi. new highways next year, according to estimates by F. R. Hewitt, Adams Co. engineer. Three-quarter of a million dollars will be spent in road betterments during next 12 months.

**W. Va., Wheeling**—City voted \$1,000,000 bonds to improve various streets; \$3,000,000 available for work. H. A. Conrad, City Engr.

**W. Va., Hinton**—Summers county is contemplating issuing following road bonds: \$90,000, Green Sulphur; \$15,000, Forest Hill District.

**Wis., Madison**—Dane Co. will spend \$100,981.42 for roads in 1920, principally the following projects: Madison-Oregon Rd., gravel surfacing and concr. bridge, \$12,000; Madison-Cambridge Rd., grading, \$10,000; Madison-Verona Rd., concr. surfacing, \$10,840.58; Madison-Portage Rd., grading, \$15,500; Edgerton-Deerfield Rd., grading and gravel surfacing, \$10,000; Mazomanie-Sauk City Rd., \$9,000; Cottage Grove, concr. surfacing Main St., \$9,000. Sauk Co. will spend \$91,449.34, as follows: Excelsior-Baraboo-Ableman Rd., \$9,900; Cassell Rd., grading and gravel surfacing, \$13,000; Honey Creek-Ableman Rd., grading and gravel surfacing, \$13,000; Hill Point Wards Corners Rd., grading and surfacing, \$18,500.

**Wis., Kenosha**—Kenosha Co. has appropriated \$148,740 for road work, principally concrete surfacing, two largest jobs being Milwaukee Rd., \$35,000, and Burlington Rd., \$67,500.

**Wis., Winter**—Sawyer co. contemplate special election on \$1,000,000 road bonds. J. Berger, co. aud.

**Wis., Madison**—The following counties made appropriations for machinery: La Crosse Co., quarry equipment, trucks, crushers and building machinery shed, \$15,000; Kenosha Co., road drags, small graders, small tractor and large truck, \$10,000; Columbia Co., 1 scarifier, 8 graders, 10 plows, 12 slip scrapers, \$18,000. J. T. Henton, Portage, Comr.

**Wis., Janesville**—Rock Co. appropriated \$58,539.63 for road work. Chas. E. Moore, Janesville, Wis., Comr.

**Wis., East End**—Douglas Co. appropriated \$10,000 for road machinery.

**Wis., Chilton**—Calumet Co. will spend \$10,799.46 on roads in 1920. Wm. Hoenig, Chilton, Wis., Comr.

**Wis., Eagle River**—Kewaunee Co. will spend \$22,304.65 for roads in 1920. Moses Shaw, Algoma, Wis., Comr.

**Wis., Manitowac**—Manitowac Co. is to vote on \$3,000,000 road bonds.

**Wis., Portage**—Columbia Co. will spend \$30,294.37 on road work during 1920.

**Wis., Wausau**—Marathon Co. appropriated \$40,997.85 for grading and surfacing various roads. J. M. Vogt, Wausau, Wis., Comr.

**N. B. St. John**—City plans to improve various streets. Work involves 50,000 sq. yd. pavement.

**Can., Ottawa**—Lincoln Highway is to be duplicated in Canada. A great transcontinental road from Halifax, N. S., to Vancouver, B. C., is to be boosted by an organization founded along lines of Lincoln Highway Association.

## BIDS RECEIVED AND CONTRACTS AWARDED.

(\*Indicates Contracts Awarded.)

**\*Ind., Knox**—Starke Co. Comrs. awarded contract for construction of Shanks Rd. in Davis Twp. at \$7,095, to E. E. Horner, Knox, Ind. Contract for construction of Slansky Rd. in Wayne Twp., at \$15,000, to Kellerman & James, North Judson, Ind.

**\*Ind., Plymouth**—Marshall co. comrs. awarded following contracts: Heinkey

gravel rd. in German twp.—\$13,500 to Newman Bros., Culver; Dillingham gravel road in Bourbon twp.—\$14,800 to Newman Bros.; Currens gravel road in Union twp.—\$18,750 to A. L. Duddleson, Culver; Hutzelman gravel rd. in Tippecanoe twp.—\$12,710 to Carvey & Crouder, Macy; Weussert gravel road in Center twp.—\$27,800 to Becker-Enyart Co., Plymouth; Stephens gravel rd. in Center, Bourbon and German twps.—\$25,320 to Becker-Enyart Co.; Bender gravel rd. in Walnut and Green twps.—\$16,978 to J. M. Hatch, Macy; Heyde gravel rd. in North twp.—\$51,857 to O'Keefe & Thompson, Plymouth; McCollough gravel rd. in North twp.—\$25,980 to Rogers, Robbins & Short Knox.

\***Mich., Lansing.**—State hwy. comr. awarded contr. to Hall-Labby, Ironwood, for 7.426 mi. clearing and grading in Marquette co.—\$117,500; also to Garvey-Weyenberg Constr. Co., Appleton, Wis., for 9 mi. clearing, grading and drainage structures in Marquette co.—\$160,000.

\***Mich., Lansing.**—McDonald & Hayly, Omer, was awarded contract for 8.068 mi. B gravel road in Arenac Co., \$112,976.04; E. McCline, Onaway, 2.935 mi. B gravel road in Presque Isle Co., \$51,538.85; Heron & McKenzie, Owendale, 1 mi. B gravel road in Huron Co., \$14,019.57.

\***O., Washington, C. H.**—Contr. for paving number of streets awarded Andrews Asphalt Co., Hamilton, at bid of \$40,000. C. R. Jacobs, co. engr.

**Ore., Portland.**—Following bids received: Grading and sidewalks on 43d ave., southeast—S. Simonsen, low bidder, \$30,310.95; Warren Constr. Co., high bidder, \$41,105.50. Pavement for Harold ave.—Municipal Paving Plant, low bidder \$12,532.45; Warren Constr. Co., high bidder, \$14,025.93.

**Pa., Harrisburg.**—Bids were opened at State Hwy. Dept. for 147 mi. of roadways in many counties and for bridges in several counties. Low-bid prices total \$6,500,000, and low bids for eastern county roads were: Berks Co., Earl & Amity, Colebrookdale and Oley Twps., 29,100 ft., Weller Constn. Co., Inc., Washington, \$221,128.35. Berks Co., Tilden and Upper Bern Twps., 14,850 ft., near Shartlesville, Bennett & Randall, Lebanon, \$105,852.10. Carbon Co., Lehigh Twp., 23,420 ft., Osborne Morgan, Wilkes-Barre, \$232,607.28. Chester Co., London and Britain Twps., 11,523 ft., extending from Franklin and London-Britain Twps. line, Winston & Co., Pottstown, \$94,892.40. Delaware Co., Thornbury Twp., 10,700 ft., from Cheney to Thorn, Sutton & Corson, Ocean City, N. J., \$92,829.10. Montgomery Co., Hatfield and Towamencin Twps., 8,586 ft., near Lansdale, Fish-Rutherford, Inc., Philadelphia, \$73,007.95. Northampton Co., Palmer Twp., 15,000 ft., from Easton to Tatamy, Smith-McCormick Co. and McInerney & McNeal, Inc., Easton, \$165,526.20. Northampton Co., 31,200 ft., from Bath to Northampton Boro., Arthur McMullen Co., Philadelphia, \$231,886.20. Susquehanna Co., Oakland Boro., 3,844 ft., Michael Barber, Binghamton, N. Y., \$38,352.20. Berks Co., Union Twp., O. B. S. Co., Philadelphia, \$31,157.04. Bucks Co., Falls Twp., O. B. S. Co., Philadelphia, \$24,377.17. Bucks Co., Falls Twp., O. B. S. Co., Philadelphia, \$28,540.90.

\***Tex., Tyler.**—Contr. for building 10 mi. rd. on Dixie hwy. let to Harris & Powell for \$100,065. Co. is to furnish material, at cost \$60,000.

\***Tex., Clarendon.**—City Comn. awarded contract for 18 additional blocks of brick paving through residential section to Panhandle Constn. Co.

\***Tex., Dallas.**—Following city contracts awarded: Dallas, 61,437 sq. yds. 2-in. bitulithic on 5-in. coner. base, at \$3.05 per sq. yd., Texas Bitulithic Co. Geo. D. Fairtrace, City Engr. Following contract awarded in Smith Co.: Harris & Powell of Taylor, 7.82 mi. D. K. Caldwell, Co. Engr.

\***Tex., Tyler.**—Tood Roads Comrs. of Smith co. let contr. for building 10 mi. road on Dixie hwy. to Harris & Powell, for \$100,065.

\***Wash., Tonasket.**—R. L. Picken has been awarded contract by Douglas county comrs. for construction of 7 miles of road between Brewsters Ferry and Bridgeport.

## SEWERAGE AND SANITATION

**Ark., Blytheville.**—Issue of sewer improvement dist. No. 1 bonds of \$25,000 has been purchased by Messrs. Bowman, Cost & Co., of St. Louis.

**Ark., Mena.**—Municipal ownership of sanitary sewer system to be tried. City will purchase system for \$36,000 and sewers will be extended to all part of city.

**Cal., Turlock.**—City will vote shortly on \$60,000 sewer system bonds.

**Cal., Turlock.**—Election will be called in near future to decide issuing sewer system bonds of \$60,000.

**Del., Farmhurst.**—Dela State Hospital will take bids in spring for sewage disposal plant to cost \$30,000. Harnson, Merty & Enlon, Commercial Trust Bldg., Philadelphia, Pa., engr.

**Ga., Grantville.**—Issuance of \$50,000 municipal bonds for construction sewers and water works system voted. The Mayor.

**Ga., Cochran.**—\$30,000 bond issue for sewer voted. City clk.

**Ill., Decatur.**—Langdon Pearse, of Pearse & Greeley, furnished Decatur Sanitary District trustees complete plans and specifications for intercepting sewer running from the St. Louis bridge to Dipper land, and bids will be advertised sometime in February. Work will be divided into three contracts as follows: Contract No. 1—Treatment plant, kind to be determined, although probably activated sludge process. Contract No. 2—Five foot intercepting sewer 7,000 ft., capable of carrying dry weather flow of city for next 25 years. Contract No. 3—Six foot intercepting sewer 7,000 ft., passing through three tunnels.

**Ind., Huntingburg.**—City plans to build sewerage system and disposal plant. \$75,000. C. Brossman, 1503 Merchants Bank Bldg., Indianapolis, Engr.

**Ia., Duncombe.**—City will take bids for sewer system. Engr., C. H. Currie. W. Mallinger, City Clerk.

**Ky., Louisville.**—Sewer bonds of \$2,000,000 have been voted for.

**La., Monroe.**—City voted bonds of \$490,000 for sewerage and drainage; 27 mi. of sewers to be laid. A. Bernstein, Mayor.

**Md., St. Michaels.**—Plans are drawn for sewer system & disposal plant, to cost \$35,000. Dr. H. C. Lieb, Pres. Bd. of Comrs., St. Michaels.

**Mass., Holyoke.**—Addresses to sewer system planned and will cost \$60,000. Address chairman, board of public works.

**Mich., Grand Rapids.**—City contemplates construction of storm and water sewers. Gerald Wagner, engr.

**Minn., Ellsworth.**—City having plans prepared building sewerage system, \$40,000. Druar & Smith, Globe Bldg., St. Paul, engr.

**Minn., Forest Lake.**—Village having plans prepared build sanitary sewerage system, \$40,000. Druar & Smith, Globe Bldg., St. Paul, engr.

**Minn., Lake Crystal.**—Blue Earth county plans drainage system for Lake Crystal, Mapleton and Beauford; cost \$250,000. Clayton L. Kennedy, county auditor, Mankato.

**Minn., Winnebago.**—Sewer work extension, to cost \$60,000, planned. C. H. Curtis, engr., Webster City, Ia. R. L. McMillan, city clk.

**Mo., Mexico.**—City voted \$25,000 bonds for sewage disposal plant.

**Neb., Gibbon.**—City plans to build new sewerage system, \$75,000.

**Neb., Alliance.**—Harris Trust & Savings Bank of Chicago has been awarded issue sewer bonds of \$55,000.

**N. C., Statesville.**—City will receive bids until Dec. 30 on sewer bonds \$75,000.

**N. D., Kenmare.**—City plans to install storm water sewer. About \$15,000.

**N. J., Fort Lee.**—Borough plans to construct sewer through southern section of Englewood to Overpeck Creek, and sewage disposal plant in connection. Address clerk borough council.

**N. Y., Endicott.**—Bond issue of \$10,000 to enlarge sewer system will be authorized. Village clerk.

**N. Y. (L. I.), Lawrence.**—Sewer system to serve four communities is under consideration. Cost, \$1,000,000. Address C. C. Adam, Village Pres.

**N. Y., Jamaica.**—Queens Topographical Bureau has completed plans for sewer system in Rockaways. Sewers will cost \$5,000,000, according to estimates. Bd. of Estimate has been requested by Boro. Pres. Connolly to take action to acquire title to property for screening and sedimentation plant on Jamaica Bay. Plant will be constructed on Rockaway side.

**N. Y., Winfield.**—Plans for trunk sewer have been completed. Address Pres. of Winfield Citizens' and Taxpayers' Association.

**O., Cleveland.**—Naming of 3 sewer commissioners to supervise expenditure of \$15,000,000, installing sewer system in outlying twps., will be taken up by Co. Comrs.

**O., Bexley.**—Sewer bonds of \$45,000 have been taken by State Industrial Comn.

**O., Middleton.**—Bids received until Dec. 19, on sewer bonds of \$20,000.

**O., New Philadelphia.**—City engr. instructed to prepare plans for sewers in 8 city streets.

**Ore., Portland.**—Plans for sewer costing \$125,130 are completed.

**Pa., New Castle.**—Bids received by city clerk for construction of storm sewer.

**Pa., Hazleton.**—Construction of storm and sanitary sewers in several streets is contemplated. Cost, \$15,000. Ora Mann, City Clerk.

**Pa., Harrisburg.**—Plans for sewer extensions in city being worked out by Comr. Lynch, Supt. of City Hwy. Dept. He is also planning for paving activities for next year. Sewer extension will be financed by fund \$100,000, which will be raised by bond issue.

**S. C., Arcadia.**—Housing development of 160 houses for Arcadia Mills is to have water and sewer systems. J. E. Serrine, Engr., Greenville, S. C.

**Tex., Houston.**—City council considers creation of drainage district for entire city; cost \$9,000,000. J. C. McVea, engr.

**Wash., Toppenish.**—City Council passed ordinance for constructing trunk sewer system, to serve Swaney and Woodlawn additions.

**Wash., Oakesdale.**—Proposition to issue sewerage system bonds of \$20,500 was submitted to voters.

**Wash., Seattle.**—The following bids were opened: Sweeney & Gallucci, brick and clay pipe, \$191,460; brick and concrete pipe, \$190,021; 36-in. brick, 42-in. concrete and clay pipe, \$181,004; 36-in. brick, 42-in. concrete and concrete pipe, \$179,565; pre-molded concrete sewer and clay pipe, \$170,793; pre-molded concrete sewer and concrete pipe sewer, \$169,354; segmental block sewer and clay pipe sewer, \$170,793; segmental block sewer and concrete pipe sewer, \$169,354. Scalzo & Co., brick sewer and clay pipe sewer, \$184,782; brick and concrete pipe, \$181,778; 36-in. brick sewer and 42-in. concrete sewer and clay pipe, \$184,782; 36-in. brick sewer and 42-in. concrete sewer and concrete pipe, \$181,778; pre-molded concrete and clay pipe, \$181,778; pre-molded concrete sewer and concrete pipe, \$178,874; segmental block sewer and clay pipe, \$175,102; segmental block sewer and concrete pipe, \$172,098. S. A. Mocerl, segmental block and clay pipe sewer, \$183,082; segmental block and concrete pipe, \$183,082.

**W. Va., Montgomery.**—Bonds voted for sewer system. Address mayor.

**Wis., Plainfield.**—Co. Comrs. will sell bonds in Dec. for drainage district, 60 mi. in towps. New Rome, Adams Co., and Leola, Waushara Co. Will advertise for bids in Jan., 1920. C. H. Pratt, Comr.

**Wis., North Freedom.**—City asked state to assist in developing water and sewage system. W. C. Hahn, City Clerk.

**Wis., New Holstein.**—City drawing plans for sewer and water systems to cost \$100,000. Jerry Donahue, engr., 609 N. 8th St., Sheboygan, Wis.

**Wis., Kohler.**—Plans in progress for sanitary sewer and water extension. Engr., J. Donahue, Est., \$75,000. Will probably install disposal plants.

**Wyo., Green River.**—Sewer assessment bonds of \$30,000 have been purchased by First National Bank of Green River.



**Ont., Owen Sound.**—Plans will be prepared for system of storm sewers for town. Engr., D. H. Fleming.

**Ont., Woodstock.**—Provincial Bd. Hlth. approved proposed new intercepting sewer and sewage disposal scheme, and by-law will be submitted at municipal elections soon. Cost, \$100,000.

**BIDS RECEIVED AND CONTRACTS AWARDED.**

(\*Indicates Contracts Awarded.)

**\*Ind., Indianapolis.**—Bd. Pub. Works awarded contract for cement sidewalks, curbs and grading lawns in Carrollton Ave. to Hugh McDonald at \$2.56 1/2 a lin. ft., total \$5,578.87. Board made order for asphalt for permanent improvement of same street.

**\*In., Osage.**—O'Neil & Preston, St. Paul, awarded contract to install sanitary sewer system at \$253,000. C. L. Pillsbury, consltg. engr., will supervise the work.

**\*N. Y., Yonkers.**—Bd. of Contract & Supply awarded contracts. Contract for Devoe Ave. sewer went to Joseph Cuozzo, who bid \$34,870. Other bidders were: Yonkers Contracting Co., \$38,549, and Nicholas Mangani, \$36,600. Bids received for completion of Allison Ave. sewer job were as follows: Joseph L. Cuozzo, \$7,747.95; Nicholas Mangani, \$8,533; Yonkers Contracting Co., \$9,329, and Nodine Constn. Co., \$9,877.

**\*O., Akron.**—Shannon Constr. Co., 1351 S. Main st., has contract for storm sewers at Firestone Park allotment, at bid of \$25,000.

**Ore., Portland.**—Following bids received: Sewer in E. 65th st.—Warren Constr. Co., \$63,817.45, only bidder. Sewer in E. 64th st.—E. Sandberg, \$3,073.15, low bidder; Warren Constr. Co., \$4,191.50, high bidder. Sewer in Bradford st.—Azar & Co., \$7,836.90; Warren Constr. Co., \$12,902.40.

**\*Tex., Dallas.**—Standard Engineering & Constructing Co. was awarded Winnetka Heights district storm sewer contract at \$237,902.20. Contract papers are being prepared for execution. The storm sewer is to be constructed for the benefit of a large area west of Tyler St. in Oak Cliff.

**WATER SUPPLY**

**Ark., Jonesboro.**—Plans made to install water system. Address Mayor.

**Ariz., Nogales.**—City plans election on \$135,000 bonds to lay 14-in. steel water mains, \$37,000, to install pumping units and \$15,000 to enlarge and repair reservoir.

**Cal., Redlands.**—Redland-Yucaipa Land & Water Co. plans to sink wells and lay water pipe on land near here, \$75,000.

**Cal., Brawley.**—City voted \$125,000 bonds to build water tank and tower, lay large water mains and install fire hydrants. G. B. Wade, City Engr.

**Cal., Hayward.**—City voted \$200,000 bonds to build water works system. M. B. Templeton, Clerk.

**Cal., Manhattan.**—City voted \$30,000 bonds to extend and repair water works system. V. H. Staheli, City Engr.

**Cal., Yucaipa.**—Redlands & Yucaipa Land Co. plans to construct water works system; \$100,000.

**Cal., Whittier.**—City voted \$361,000 bonds to develop additional water supply. J. B. Lippincott, 1134 Central Bldg., Los Angeles, Engr.

**Cal., Ontario.**—Election will be held to decide question of issuing \$116,000 bonds for water and fire department.

**Colo., Vona.**—Election Jan. 3 to vote \$125,000 water bonds.

**Colo., Pueblo.**—\$130,000 bond issue for water works has been sold.

**Ga., East Lake.**—Election in near future to vote on \$15,000 water system bonds.

**Ga., Cochran.**—City in favor of \$15,000 bond issue for improvement of municipal water and light plant. H. D. Sturdevant, Engr.

**Ida., Cambridge.**—City plans to build water works system in spring; \$25,500. S. M. French, Cambridge, Engr.

**Ill., Decatur.**—Bids for construction of new dam probably will be sought in Jan-

uary. Langdon Pearse of engineering firm of Pearse & Greeley, told City Council.

**Ind., North Judson.**—State board of tax comrs. has approved petition of the town of North Judson to issue \$28,800 water works bonds.

**In., Farragut.**—Water works bonds of \$25,000 authorized some time ago has been disposed of.

**In., Quimby.**—City drawing plans for water works. Engr., C. H. Currie, Webster City, Ia.; \$16,000. O. F. Parker, City Clerk.

**Kan., Aurora.**—City plans to build water works system, pumping plans, steel tank, etc.

**Kans., Axtel.**—Plans being drawn for city water works to cost \$50,000. Address city clerk.

**Kan., Solomon.**—Election called to vote on \$75,000 water works bonds.

**Kans., Preston.**—Bonds soon to be voted on water works improvements of \$31,000. L. C. Mosier, city clerk.

**La., Lake Arthur.**—City voted \$50,000 bonds for water works.

**La., Lake Arthur.**—Recent election resulted in issuing water works bonds of \$50,000.

**La., Monroe.**—City voted bonds of \$1,450,000, of which \$450,000 will be spent for water works and light plant.

**Minn., Alexandria.**—Considerable extension of water system is planned for next year. G. T. Roberts, City Clerk.

**Mont., Conrad.**—Special election soon to vote on \$180,000 bond issue for water works. V. Ferguson, City Atty.

**Mont., Conrad.**—City Atty V. Ferguson authorized election on \$180,000 bonds to install water plant.

**Mo., Caruthersville.**—Election was held to vote on proposition to issue water system bonds of \$50,000.

**Mo., Joplin.**—Water works improvements planned for city, including plants, filtering stations, reservoirs and settling basin at or near the base supply. Total cost for plants and mains is about \$1,478,956.

**Neb., Auburn.**—City may issue \$55,000 water works system bonds. M. Armstrong, clk.

**Neb., Lincoln.**—City will vote on \$200,000 bonds to extend water works system; plans include 10,000,000-gal. pump. Burns & McDonnell, Interstate bldg., Kansas City, Mo., engr.

**Neb., Schuyler.**—Special election called for Jan. 6 to vote issuance of water extension bonds of \$26,000.

**Neb., Venange.**—Recent election resulted in favor of issuing water bonds of \$26,000.

**N. J., West Orange.**—Commonwealth Water Co. has received permission to construct a \$1,000,000 gal. reservoir and pumping station.

**N. Y., Olean.**—Field, Richards & Co., successful bidders for \$60,000 water bonds.

**N. C., Wake Forest.**—Sealed bids received until Jan. 8 for water and sewerage system bonds of \$100,000. Mayor J. G. Mills.

**N. D., Mayville.**—City plans election soon to vote on \$10,000 bonds to install water softening plant. A. Jorndet, City Engr.

**Okla., Depew.**—City voted \$45,000 bonds to extend water works and electric light systems.

**Okla., Oklahoma City.**—It is proposed to improve water system at cost \$127,000. J. H. Patterson, Comr. of Public Property.

**Okla., Henryetta.**—City voted \$200,000 bonds to improve water works system. Burns & McDonnell, Interstate bldg., Kansas City, Mo., engr.

**Okla., Foraker.**—\$40,000 water system bonds recently carried.

**Okla., McAlester.**—Election called for Dec. 22 to vote issuance of water works bonds of \$125,000.

**O., Youngstown.**—\$600,000 bond issue authorized for reinforcement of water main system. Address Supt. Kaercher.

**O., Columbus.**—South Side Civic Association has asked council to provide water connections for South Side; cost \$200,000.

**O., Bucyrus.**—Council adopted ordinance providing for issuing \$560,000 bonds for fund to buy water works from Bucyrus Development Co.

**O., Dayton.**—City plans to build 15,000,000-gal. storage reservoir and 2 feed lines from reservoir at Ohmer Park, \$175,000. F. O. Eichelberger, city engr.

**Ore., Klamath Falls.**—Klamath Irrigation Dist. plans election in January to vote on \$175,000 bonds to build reservoir dam, flumes, canals and laterals adjoining Klamath Falls. I. R. Struble, Mayor.

**Ore., Reedsport.**—City voted to bond city for municipal water system, involving tunnel of 1,100 ft. and 5 1/2 ml. pipe line.

**Pa., Morrisville.**—City voted \$45,000 bonds for water works system. T. F. Bowe, Triangle st., East Rutherford, N. J., engr.

**S. Dak., Willow Lake.**—Special election to vote on \$75,000 bonds for installing water works plant and sewerage system.

**Tenn., Pulaski.**—Plans being considered for new water system. \$158,000 to \$300,000. Address Mayor Dale.

**Tenn., Memphis.**—Town of Binghamton has become part of city of Memphis and will be supplied with water from city's water system.

**Tex., Abilene.**—Municipal bond issue of \$450,000 carried. Bonds are to complete Lake Abilene and build pipe line into city.

**Tex., Abilene.**—City voted \$450,000 bonds to build pipe line to Lake Abilene.

**Tex., Dallas.**—Water main extensions to be made as soon as city buy pipe, including, 700 feet on Metropolitan, Hamilton and Cross Sts., approved by City Commission.

**Tex., Eastland.**—H. P. Brelsford and associates plan to build dam across Leon River, to include reservoir 35 ft. high, and lake 1/2 mile long, 1,500 ft. wide; \$125,000. Texas & Pacific Ry., Eastland, Engrs.

**Wash., Walla Walla.**—Conjointly with special election to bond Walla Walla for \$500,000 to improve water systems, Dec. 16, county will also hold federal aid road bonding election to raise \$80,000 additional money.

**Ont., Windsor.**—Water board contemplates petition to construct \$350,000 filtration plant.

**Wash., Selah.**—General plans for water system for town were adopted at meeting of council. Specifications were submitted by two engineers, N. A. Gilman, of Yakima, and a representative of O. H. Green & Co., of Spokane. Special election to vote on bonds for speedy construction of system will be held soon.

**W. Va., Charleston.**—Extensive impvt. in water system planned. J. N. Craddock, mayor.

**LIGHTING AND POWER**

**Ala., Montgomery.**—Montgomery Light & Water Power Co. contemplates improvement involving \$500,000.

**Cal., San Francisco.**—Sespe Light & Power Co. plans construction of hydro-electric plant and irrigation projects on Sespe and Piru River in Ventura county.

**Iowa, Meservey.**—Bond issue of \$93,500 carried at election for light plant. Iowa Falls Electric Light Co. will erect lines and furnish power. F. Hofferma, city clerk.

**Mich., Holland.**—City Council instructs Bd. of Public Works to prepare plans and estimates for municipal gas plant.

**N. J., Trenton.**—Public Utility Comm. issued order directing Public Service Gas Co. to extend mains in Garfield Ave., Palmyra Twp. Burlington Co. Comm. also made order requiring Standard Gas Co. to submit plans for increasing its generating capacity in order to furnish adequate service at Freehold. Keansburg, Keyport and intervening territory.

**Neb., Bruno.**—Special election resulted in favor of issuing power plant bonds of \$10,000.

**N. J., South River.**—Preparations being made by Bd. of Public Works to enlarge borough's power plant by installing two 500-kilowatt steam turbine engines has been completed.

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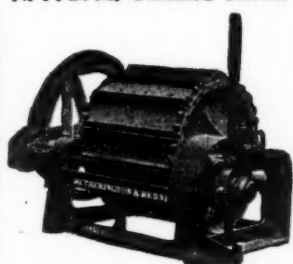
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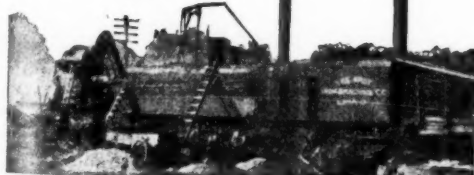
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**Okla., Tahlequah**—Issue of electric light plant bonds of \$100,000 was recently sold.

**O., Minerva**—Casady Bond Co. of Des Moines has been awarded \$50,000 issue of electric light plant bonds.

**O., Struthers**—Construction of municipal lighting plant is proposed.

**Pa., Bethlehem**—Dec. 29, Mayor will sell bonds of \$80,000 for boulevard street lighting.

**Pa., Bethlehem**—On Dec. 29 Mayor will sell \$80,000 bonds for boulevard street lighting.

**S. D., McIntosh**—Voters approved proposition for municipal light plant at special election. New plant will be built in spring.

**Tex., Bryan**—City Comrs. authorized building addition to present power house. Work will be done under the supervision of City Manager Greer.

**Ont., London**—Addition is to be built in 1920 to hydro station on Ridout and Horton sts., at cost of \$30,000. Work, Engineer Buchanan stated, would probably begin in March.

## FIRE

**Cal., Livermore**—Election Nov. 4 in favor of issuing fire apparatus bonds \$10,000.

**Conn., Norwalk**—Chief recommends purchase of new engine and improvement of alarm system.

**Del., Dover**—Committee appointed to devise ways and means of securing fire truck with pumping attachments.

**Ill., Logansport**—Ordinance before council, providing for issue of \$35,000 bonds to motorize fire dept.

**Ind., East Chicago**—\$11,200 fire engine bond issue awarded Fletcher-American Co., Indianapolis.

**Kan., Hutchinson**—Shawnee Investment Co., Topeka, awarded \$30,000 fire station bonds.

**La., Bogalusa**—\$15,000 bond issue has been authorized for new fire alarm system. Address City Clerk.

**Mass., Dracut**—Budget for next year contains provision for fire protection.

**Mass., Gloucester**—Apparatus in Central Station is to be motorized immediately. Clerk, board of aldermen.

**Minn., Albert Lea**—H. Soth, fire chief, contemplates purchase of fire alarm system.

**N. J., Bridgeport**—Town voted to procure better fire equipment. To. Clk.

**N. Y., New York City**—Fire Commissioner Thomas J. Drennan will advertise at once for sealed bids on \$330,000 worth modern fire fighting apparatus to replace horse-drawn equipment as follows: Twenty-one gasoline propelled pumping engines, four city service fire trucks, two trucks with 75 ft. extension ladders and two with 65 ft. extension ladders, six motor hose wagons, one water tower, and one gasoline and oil supply wagon to feed motor apparatus when it is in service at a fire.

**N. Y., Niagara Falls**—Council favors election early next year on improvements to fire apparatus to cost \$15,000. A. H. Newman, Fire Chief.

**O., Kent**—Fire Dept. is considering purchase of siren. A device similar to one in use at Cuyahoga Falls is under consideration.

**Pa., Bethlehem**—City will sell bonds of \$65,000 for extension and improvement

of fire alarm, telegraph system and police signal system.

**Pa., Le Raysville**—New apparatus in planned for fire department. Address Secretary of Councils.

**Pa., Bethlehem**—Jan. 5, city will sell \$65,000 bonds for fire alarm and police signal system.

**Pa., Summit Hill**—Town Council will install new fire alarm system. Clerk of Council.

**Pa., Sharon**—Fire dept. building is to be remodeled and new apparatus will be purchased when work is completed.

**Pa., Wilmerding**—Purchase of adequate fire equipment being considered. Boro. pres.

**R. I., Providence**—Bond issue of \$160,000 for new building and fire alarm system is contemplated. Address Chairman Com. on Finance.

**Va., Norfolk**—Residents of Madison Ward have petitioned for establishment of fire station with suitable apparatus in that ward. Address City Manager Fates.

**W. Va., Kenova**—Council is considering purchase of fire equipment. Address Clerk of Council.

## BRIDGES

**Cal., Fresno**—5 rein. concr. bridges planned on new co. hwy. system. Address surv. of Fresno co.

**Cal., Porterville**—Plans approved for concrete bridge over Porter Slough at Main St.; estimate, \$30,000. Address F. W. Pease, City Engr.

**Ky., Warfield**—Himler co. will constr. bridge over Tug river. \$130,000.

**Mass., Boston**—New bridge to replace Chelsea south bridge is contemplated. Cost \$500,000.

**Mich., Lansing**—City will issue bonds to construct three bridges; also seven other bridges to be replaced by new ones.

**N. J., Freehold**—Five bridges planned in Monmouth Co.; estimate \$500,000. Address Co. Clerk.

**N. C., Wilmington**—War Dept. notified State Hwy. Comm. of its approval of a bridge over Brunswick River, thus assuring the building of New Hanover-Brunswick causeway. It is expected bids for construction of the work will be advertised for, and actual work begin in course of few weeks.

**O., Columbus**—Franklin Co. voted \$375,000 bonds to build bridge over Scioto River, on Greenlawn Ave. C. C. Lattimer, Co. Surv.

**O., Fremont**—Constr. of concr. arch bridge at State st., to cost \$200,000 under advisement between city and co. officials. L. H. Wisner, co. engr. constr. of proposed bridge across Sale river. Cost \$50,000.

**Pa., Pottsville**—Schuylkill Co. commrs. will take bids for bridge over Schuylkill River to cost \$30,000.

**Pa., Bethlehem**—City will sell Jan. 5 bridge bonds of \$405,000.

**S. C., Gaffney**—Cherokee Co. soon lets contract one 50 ft. rein.-concr. span over Little Thickety Creek, 2 rein. abutments. Work involves 378 cu. yd. dry and 170 cu. yd. wet excava., 550.8 cu. yd. concrete and 37,535 lb. deformed steel. \$24,000. State Hwy. Dept., Columbia, Engrs.

**S. Dak., Sioux Falls**—Co. and State Highway Commrs. will construct two concrete bridges on road from 6th St. to West Sioux Falls.

**N. B., Fredericton**—Canadian National Rys., 27 Wellington Et., E. Toronto, preparing plans for bridge over St. John River. About \$1,000,000. A. F. Stewart, Ch. Engr.

**Wis., Summit**—Plans being prepared for Oconomowoc River bridge, which will be 40x24 ft., rein. concr. deck girder bridge with concr. abutments. Chas. J. Hahn, Delafield, Wis., Comr.

**Wis., Appleton**—Outagamie Co. Board voted to build 13 bridges at total cost \$12,331.

## BIDS RECEIVED AND CONTRACTS AWARDED

**Kan., Wellington**—Following bids received on State Creek bridge 2 50 ft. reinf.-concr. through girders complete: Merydith Construction Co., \$24,483.17; Missouri Valley Bridge Co., \$18,816.95; Pine Grove Construction Co., \$32,653.95; Republic Concr. Construction Co., \$19,279.62.

**\*Mass., Boston**—Contract has been awarded William L. Miller Co. of Charlestown for bridge to be built over Mystic River for Boston & Maine Railroad Com. \$50,000.

**\*Wash., Walla Walla**—Union Bridge Com. of Portland was given contract for six concrete bridges by county of Walla Walla. Contracts aggregate \$69,267 and include bridge over Walla Walla River south of Lowden. Price \$37,820.

**Wis., Milwaukee**—Only two construction companies submitted bids to city to erect new North Ave. bridge. Klug & Smith Milwaukee, bid \$643,000. Standish & Allen Chicago, only other bidder, asked \$894,931. New span will be more than 1,000 ft. long and of concrete construction. Approach to bridge will be several feet long.

## MISCELLANEOUS

**D. C., Washington**—Congressman Stephen G. Porter of Pennsylvania introduced bill in House which provides for appropriation \$50,000 to be spent under direction of Secretary of War in making examinations, investigations and surveys and preparing plans and estimates of cost for controlling the flood water of Allegheny and Monongahela Rivers and their tributaries.

**Ia., Cedar Falls**—City received donation of \$25,000; \$15,000 will be used to purchase park tract, and \$10,000 for improvements of same. S. S. Huntley, City Clerk.

**La., Monroe**—City intends to build garbage incinerator of two tons per hour capacity; cost \$12,000. W. G. Kirkpatrick, Engr.

**La., New Orleans**—New Orleans has awarded \$5,000,000 Port of New Orleans bonds to Hibernia Bank & Trust Co. and associates of New Orleans at par.

**Mich., Detroit**—Estimates of cost of additional machinery to be used by water board in gigantic water main extension program for the season of 1920 were filed with Mayor Couzens. It is planned to purchase five new trench excavators, a concrete breaker, used in opening excavations on paved streets, backfillers, tractors, and graders, together with cranes for handling pipe and pumps, and a portable lighting plant. \$101,650. Pipe and other construction material will cost \$1,601,385, which with new machine shop and storage yard equipment, will make total expenditures of board \$1,884,908 for coming year.

**N. J., Camden**—City Council orders park bonds of \$103,000 issued; \$78,000 will be expended at Pyne Poynt; \$15,000 at Line Ditch tract, and \$10,000 in raising and widening Baird Ave. Provision was made

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